A

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA.

BY

GEORGE WATT, M B, C M, C I E
REPORTER ON ECONOMIC PRODUCTS WITH THE GOVERNMENT OF INDIA
OFFICIER D'ACADEMIE, FELLOW OF THE LINNEAN SOCIETY, CORRESPONDING MEMBER OF THE ROYAL HORTICULTURAL SOCIETY, &c &c

(ASSISTED BY NUMEROUS CONTRIBUTORS)

IN SIX VOLUMES

VOLUME III,

Dacrydium to Gordonia.



Published under the Authority of the Government of India
Department of Revenue and Agriculture

LONDON
W H ALLEN & Co, 13 WATERLOO PLACE, S W, PUBLISHERS TO THE INDIA OFFICE

CALCUTTA
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA
8, HASTINGS STREET

1890

CALCUTTA:
GOVERNMENT OF INDIA CENTRAL PRINTING OFFICE,
8, HASTINGS STREET.

PREFACE TO VOL III.

SUBSEQUENT to the appearance of the first volume of this work, the Editor was engaged, for nearly two years, in connection with the Colonial and Indian Exhibition. On his return to India in April 1887, he resumed the Dictionary work, and the second volume was published in little more than a year from that date. During the course of preparation of that volume, however, the Government of India considered it desirable to modify materially the scope and character of the work, enlarging it in some directions and abbreviating it in others It was, for example, deemed unnecessary to give botanical descriptions of the plants dealt with, and thought advisable to practically omit all imported articles of Indian trade, to discontinue reference to Ceylon products, when not directly connected with India, and also to reduce the number of tables given in statistical accounts of trade. A minor departure was, at the same time, enjoined in the adoption of the third person, in preference to the first, but that would in any case, have been necessitated, for, shortly after the second volume had been completed, the Government of India was enabled to render in valuable aid by the deputation as collaborateurs of Mr J F Duthie, Direct or of the Botanical Department, Northern India, and shortly afterwards of Dr. J Murray, of the Indian Medical Service. The Editor has now to express his warmest thanks to these gentlemen for the able assistance they have rendered He need only add that the respective share taken by each contributor is indicated by the appearance of his name on the right hand top corner of the pages.

During the preparation of the third volume the Editor's task was indeed a pleasant one, for, the entire material of the Dictionary having been brought together and arranged by him some years ago, his editorial work consisted in seeing that the elaboration of the portions entrusted to his collaborateurs was on the plan laid down by the Government of India

It may perhaps be admitted that the third (and perhaps also the second) volume manifests a considerable improvement on the first This was to be expected, since the co operation of Mr. Duthie and Dr. Murray ensured greater accuracy, through doubtful points having invariably been decided in consultation A numerous circle of correspondents have also been consulted, amongst whom may be specially mentioned Dr George King *Superintendent of the Royal Botanic Gardens and Dr D Prain, Curator of*

the Herbarium, Calcutta; Mr. H. Medlicott (and his successor Dr. W. King), Superintendent of the Geological Survey; and the authorities of the Imperial Museum. The Directors of Land Records and Agriculture in the various provinces, by official requisitions through the Revenue and Agricultural Department of the Government of India, have given the Editor much useful information on various subjects. On trade questions invaluable assistance has been rendered by Mr. J. E. O'Conor, Assistant Secretary to the Government of India, Finance and Commerce Department, by the Chambers of Commerce, and by many mercantile experts and planters throughout the country, to all of whom the Dictionary is indebted for many of its most useful features. The official correspondence of the Government of India has also continued to be placed under free contribution, and the various branches of the Secretariat have uniformly and graciously responded to applications for assistance by placing their files on Economic Products at the disposal of the Editor.

GEORGE WATT,

Editor, Dictionary of the Economic Products of India.

SIMLA,
July 1890.

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA.

DACRYDIUM, *Soland, Gen Pl, III, 433.*

Dacrydium elatum, *Wall; Fl Br. Ind, V, 648;* CONIFERÆ 1

References —*Kurz, Forest Flora, Burma, II, 499, Gamble Man Timb, 394, Indian Forester, III, 178 9, VII 362, XI, 106 XII, 282, Smith, Econ Dict, 217, 353, Trans Agri Hort Soc Ind, V, 110*

Habitat —Burma, probably Tenasserim A tree, 30 to 60 feet in height, with dimorphous leaves Very little is known regarding it and it is, therefore, alluded to here more on account of the high value placed on its congeners than of any special properties reputed to be possessed by the Indian representative.

DACTYLIS, *Linn, Gen Pl, III., 1193.*

Dactylis glomerata, *Linn;* GRAMINEÆ. 2

COCK S FOOT GRASS

Syn —D HISPANICA, *Roth*, D GLAUCESCENS, *Willd*

References —*Roxb, Fl Ind, Ed C B C, 114, Voigt, Hort Sub Cal, 717, Thwaites, En Ceylon Pl, 374; Mueller Select Ex Trop Pl, 101; Murray, Pl and Drugs Sind, 14, Royle, Ill Him Bot, 28, 417, 423, Treasury of Bot, 379, Morton Cyclop Agri, 600*

FODDER. 3

forms a portion of most good pastures, especially on chalky or loamy soils In *Morton's Cyclopædia of Agriculture* a full account of the grass is given It is there said to be "one of the most widely distributed and valuable of hay and pasture grasses, being common in all countries of ... and in ... orms a ... ' The soil required is said to be of a deep, rich, and moist but not saturated

FODDER.

description:" "the finest developed native specimens are generally found in waste places, by the sides of hedges and dykes, on way-side banks, and in shady copses. It surpasses most of the native grasses in the enduring rapidity of its growth after being eaten or cut down, as well as in the quantity and quality of its produce; and as it is readily devoured by cattle, sheep, and horses, it became, at an early period in the history of grass culture, an object of agricultural care, having been grown in England in 1764, and that, at first, from seed received under its American name of *Orchard grass*, from Virginia, where considerable progress had been made in its cultivation." Royle alludes to it as common on the North-West Provinces and the Panjáb Himálayas, and in Atkinson's *Himálayan Districts* it is said to occur at Naini Tál, Kathi, Jalat, and Jhuni on open situations, at an altitude of 6,000 to 8,000 feet. By several writers it is spoken of as "frequent on the Himálayas," but no effort appears to have been made to cultivate the plant for fodder purposes. In the *Gazetteer* of Mysore and Coorg it is said to be cultivated in the Bangalore Gardens, but practical experiments have still to be performed to ascertain the Indian regions where its cultivation is possible. Roxburgh alludes to two plants—**D. lagopoides**, *Linn.*, and **D. brevifolia**, *Linn.*—as found on salt, sandy soil near the sea. The former is referred to by Dalzell and Gibson (*Bombay Flora, p. 298*) as common near the sea, and is said to be the **Poa brevifolia**, *Kunth.* Roxburgh placed these plants in **Dactylis**, because of Burman having done so, but was of opinion that they were more probably forms of **Poa**. At all events they are not species of **Dactylis**.

Dactyloctenium ægyptiacum, *Willd.*; GRAMINEÆ, see **Eleusine ægyptiaca**, *Pers.*

D. scindicum, *Boiss.* see **Eleusine scindica.**

DÆDALACANTHUS, *T. Anders.; Gen. Pl., II., 1082.*

A genus of shrubs containing several highly ornamental plants, some of which are extensively cultivated in Indian gardens. They are known to afford indigo, a property possessed by many members of the family to which they belong. It is probable also that they are all, like **D. roseus**, used medicinally. The following may be specially enumerated.

[ACANTHACEÆ.

4

Dædalacanthus nervosus, *T. Anders.; Fl. Br. Ind., IV., 418;*

Syn.—JUSTICIA NERVOSA, *Vahl., Bot. Mag., t. 1358;* ERANTHEMUM NERVOSUM, *Br. Prod., 477.*

Vern.—*Shechin*, NEPAL; *Topatnyok*, LEPCHA; *Nalla nilámbari, vádámbram*, TEL.

References.—*Gamble, Man. Timb., 280; Cat. Darj., 59; Walter Elliot, Flora Andhr., 126, 187; Bomb. Gaz., XV., 440; N.-W. P. Gaz., IV., p. lxxvi.*

Habitat.—A frequent plant at the base of the Himálayas (1,000 to 3,000 feet) from the Panjáb to Bhután. Cultivated in most tropical countries; flowers bright blue.

Properties of this and the other species have been described for the sake of economy under the genus.

5

D. purpurascens, *T. Anders.; Fl. Br. Ind., IV., 420.*

Syn.—ERANTHEMUM NERVOSUM, in *Dalz. & Gibs., Bomb. Fl., p. 195;* E. PULCHELLUM, *Roxb., Fl. Ind., Ed. C.B.C., 37.*

Vern.—*Kalla-jati*, BENG.; *Gul-sham*, HIND.

Habitat.—A fairly abundant plant in the forests of the central table-land of India, at altitudes of 1,000 to 4,000 feet in Central India, Bombay

Ghats, Belgaum, Parisnath Assam, &c. Roxburgh describes it as "a most stout flowering shrub' "generally in its full beauty in February"

Dædalacanthus roseus, *T Anders ; Fl Br Ind, IV, 419* — 6

Syn — Justicia rosea, *Vahl ;* Eranthemum roseum, *Br*

Vern — *Dasmuli*, Mar

References — *Dalz & Gibs, Bomb Fl, 195, Dymock Mat Med W Ind, 2nd Ed, 587*

Habitat — A shrub 2 to 6 feet in height, flowers deep blue turning bright red as they fade Frequent in the Western and Southern Deccan, from Bombay Ghats to Mangalore

Medicine — Dymock mentions "the root boiled in milk is a popular remedy for leucorrhœa, dose, one drachm In the Southern Concan it is given to pregnant cattle to promote the growth of the fœtus' — MEDICINE Root. 7

D. splendens, *T Anders, Fl Br Ind, IV, 418* — 8

Reference — *Gamble, Man Timb, p 280*

Habitat — A handsome shrub, with long spikes of pink flowers, common in the undergrowth of *Sal* forests (*Gamble*)

DÆMIA, *R Br, Gen Pl, II 764*

[Asclepiadeæ

Dæmia extensa, *R Br, Fl Br Ind, IV, 20, Wight, Ic, t 596,* — 9

Syn — [illegible]

Ve[illegible]

References — [illegible] *Ceylon Pl, 196,* [illegible] *, Aitchison, Cat* [illegible] *Sir Walter Elliot* [illegible] *Linn, Soc Jour, XIX, 177 Pharm Ind, 142, Ainslie, Mat Ind II, 452* [illegible]

Habitat — A common fœtidly-scented climber, met with throughout the hotter parts of India ascending to 3 000 feet but does not apparently occur in Burma or the Malay Peninsula Distributed to Afghánistan

Fibre — The stems yield a fibre wh ch has been recommended as a substitute for flax It is sa d to be very fine and strong, a sample shown at the Madras Exhibi ion 1855, gained a medal Birdwood in his *Bombay Products* remarks that it is the commonest weed in the Deccan, where it is called *Ootrun*, and that the late Colonel Meadows Taylor was the first to draw attention to its valuable fibre Although this fibre is frequently mentioned by Indian writers it does not appear to have been thoroughly examined In *Spons' Encyclopædia* the statements, first published in the *Madras Jury Reports*, are reproduced But neither Roxburgh nor Royle appear to have examined the fibre Balfour says it is — FIBRE. Stems 10

FIBRE.

a promising substitute for flax. In a recent report furnished by the Conservator of Forests, Northern Circle, Madras, it is stated that "the plant is common in the drier districts of the Presidency. It affords a very pretty fibre which is said to be sometimes used for fishing lines."

The fibre was not shown at the Colonial and Indian Exhibition, but as the plant is extremely plentiful, there should be no difficulty in procuring a large annual supply.

MEDICINE Plant. 11 Leaves. 12 Juice. 13

Medicine.—The PLANT has emetic and expectorant virtues, and is extensively employed by natives in the diseases of children. Ainslie says that "a decoction of the LEAVES is given to children as an anthelmintic, in doses not exceeding three table-spoonfuls; the JUICE of the leaves is ordered in asthma." The *Pharmacopœia* assigns the above properties to it, as current native opinion, but adds that, although reputed to be a cure for snake-bite, this rests on insufficient grounds. Dr. Oswald held that it was a fairly good expectorant in the treatment of catarrhal affections, in ten-grain doses, for which purpose it was used at the Pettah Hospital, Mysore. Dr. Dymock says that in "Western India the plant has a general reputation as an expectorant and emetic. In Goa the juice of the leaves is applied to rheumatic swellings." Drury adds the further fact that "the juice of the leaves mixed with *chunam* is applied externally in rheumatic swellings of the limbs."

SPECIAL OPINIONS.—§ "Used in infantile diarrhœa." (*Surgeon-Major D. R. Thomson, M.D., C.I.E., 1st District, Madras*). "The fresh leaves made into a pulp are used as a stimulating poultice in carbuncle, with good effect" (*Asst Surgeon Sakharam Arjun Ravat, L.M., Bombay*). "Certainly valuable as an emetic with infants: the *leaves* are washed, and the juice expressed by rubbing between the palms of the hands; the leaves of the dark *Toolsi* are similarly treated, and then a mixture of the juices is given; this preparation is a stimulating emetic" (*Civil Surgeon B Evers, M D., Wardha*).

FODDER. Plant. 14

Fodder.—The PLANT is said to be browsed by goats.

Dœmonorhops (Calamus) Draco.—The Dragon's Blood Palm; see Vol. II., C. No. 68.

15

Dahi (DADHI, *Sans.*)

A term given to a kind of curd or rather coagulated milk. To prepare this the milk is first boiled, then soured by being thrown into an unwashed vessel in which *dahí* had been previously kept. At times, however, an acid is employed to precipitate the solid ingredients of the milk, and rennet is used by a certain limited community only. *Dahí* thus differs from curd as prepared in Europe in being practically sour boiled milk. The milk is boiled almost immediately after being obtained from the cow, and thus contains all its fat or butter. *Dahí* in the liquid state is largely consumed, so that the whey not being separated *Dahí* contains in solution all the sugar of milk. The curd or casein, even if separated from the whey, contains, however, too much fat to be made into cheese. It is, in fact, cream cheese, and on drying crumbles to a powder. The whey is separated by pressing the curd inside a cloth, and in this condition it is largely used in cookery, and is the basis of all the sweetmeats made in India. The natives of India have thus come to learn that to eat the liquid *dahí* they are consuming a wholesome mixture of the muscle-forming materials casein and fat with the heat-giving ingredient—sugar—the equivalent of starch. But to eat the curd alone to any large extent would be injurious by causing severe constipation. After being made into sweetmeats it is, however, rendered highly nutritious through having restored to it sugar,

DAHI.

and by being mixed with flour of wheat or of rice is made into an article of diet Hence it follows that the sweetmeats so largely consumed as a midday meal in India partake of all the ingredients of food and are not mere luxuries like the sweets of Europe.

The trade in expressed *dahí* is very extensive, and within a radius around the larger cities immense quantities are carried by train—the plastic substance being contained within a cloth and resting in open baskets. The manufacture of cheese is practically unknown in India

See Milk and Rennet.

16

Dakh, a term applied in Hindustani to grapes, but also to raisins, currants, or the fruit of Sageretia oppositifolia—the *gidardak* or Jackal's vine

17

Dakra, a substance said to be used in Nepal to poison elephants It is made up in balls along with rice *Dakra dhakka*, &c, are names given to **Elæodendron Roxburghii**, the bark of which is a virulent poison, and **Cissampelos Pareira** is said to be the *Dakh nirbisi*, or antidote to *Dakh* The exact nature of the Nepal poison does not appear to have been made known, but it more than likely contains Aconite

18

Dal, a generic name for split peas, but more especially applied to the split peas of **Cajanus indicus**, the *Arhar ka dal*, **Phaseolus Mungo** and **P radiatus** are the *Mung ka dal*, while **Cicer arietinum** (gram) is the *Channa-ka dal*, and **Lens esculenta** the *Masur-ka-dal*

DALBERGIA, *Linn*, *Gen Pl*, *I*, 544

monosperma These are the species which, in the *Flora of British India*,

19

Dalbergia cana, *Grah*, *Fl Br. Ind*, *II*, 237, LEGUMINOSÆ

Habitat —

(according to

the eastern

Martaban de

TIMBER. 20

Structure

of a very coarse fibre, soon attacked by xylophages" (*Kurz*, *For Fl Burm*, *I*, 344)

21

D. cultrata, *Grah*, *Fl Br Ind*, *II* 233

Vern —*Yendike, yindaik, veng-daik*, BURM

FIBRE.

a promising substitute for flax. In a recent report furnished by the Conservator of Forests, Northern Circle, Madras, it is stated that "the plant is common in the drier districts of the Presidency. It affords a very pretty fibre which is said to be sometimes used for fishing lines."

The fibre was not shown at the Colonial and Indian Exhibition, but as the plant is extremely plentiful, there should be no difficulty in procuring a large annual supply.

MEDICINE Plant. 11 Leaves. 12 Juice. 13

Medicine.—The PLANT has emetic and expectorant virtues, and is extensively employed by natives in the diseases of children. Ainslie says that "a decoction of the LEAVES is given to children as an anthelmintic, in doses not exceeding three table-spoonfuls; the JUICE of the leaves is ordered in asthma." The *Pharmacopœia* assigns the above properties to it, as current native opinion, but adds that, although reputed to be a cure for snake-bite, this rests on insufficient grounds. Dr. Oswald held that it was a fairly good expectorant in the treatment of catarrhal affections, in ten-grain doses, for which purpose it was used at the Pettah Hospital, Mysore. Dr. Dymock says that in "Western India the plant has a general reputation as an expectorant and emetic. In Goa the juice of the leaves is applied to rheumatic swellings." Drury adds the further fact that "the juice of the leaves mixed with *chunam* is applied externally in rheumatic swellings of the limbs."

SPECIAL OPINIONS.—§ "Used in infantile diarrhœa." (*Surgeon-Major D. R. Thomson, M.D., C.I.E., 1st District, Madras*). "The fresh leaves made into a pulp are used as a stimulating poultice in carbuncle, with good effect" (*Asst Surgeon Sakharam Arjun Ravat, L.M., Bombay*). "Certainly valuable as an emetic with infants: the *leaves* are washed, and the juice expressed by rubbing between the palms of the hands; the leaves of the dark *Toolsi* are similarly treated, and then a mixture of the juices is given; this preparation is a stimulating emetic" (*Civil Surgeon B. Evers, M.D., Wardha*).

FODDER. Plant.

Fodder.—The PLANT is said to be browsed by goats.

14

Dæmonorhops (Calamus) Draco.—The Dragon's Blood Palm; see **Vol. II., C. No. 68.**

15

Dahi (DADHI, *Sans.*)

A term given to a kind of curd or rather coagulated milk. To prepare this the milk is first boiled, then soured by being thrown into an unwashed vessel in which *dahí* had been previously kept. At times, however, an acid is employed to precipitate the solid ingredients of the milk, and rennet is used by a certain limited community only. *Dahí* thus differs from curd as prepared in Europe in being practically sour boiled milk. The milk is boiled almost immediately after being obtained from the cow, and thus contains all its fat or butter. *Dahí* in the liquid state is largely consumed, so that the whey not being separated *Dahí* contains in solution all the sugar of milk. The curd or casein, even if separated from the whey, contains, however, too much fat to be made into cheese. It is, in fact, cream cheese, and on drying crumbles to a powder. The whey is separated by pressing the curd inside a cloth, and in this condition it is largely used in cookery, and is the basis of all the sweetmeats made in India. The natives of India have thus come to learn that to eat the liquid *dahí* they are consuming a wholesome mixture of the muscle-forming materials casein and fat with the heat-giving ingredient—sugar—the equivalent of starch. But to eat the curd alone to any large extent would be injurious by causing severe constipation. After being made into sweetmeats it is, however, rendered highly nutritious through having restored to it sugar,

DAHI.

and by being mixed with flour of wheat or of rice is made into an article of diet Hence it follows that the sweetmeats so largely consumed as a midday meal in India partake of all the ingredients of food and are not mere luxuries like the sweets of Europe

The trade in expressed *dahī* is very extensive, and within a radius around the larger cities immense quantities are carried by train—the plastic substance being contained within a cloth and resting in open

practice of rapidly boiling milk which is all but universal in this country See **Milk** and **Rennet.**

Dakh, a term applied in Hindustani to grapes, but also to raisins, currants, or the fruit of **Sageretia oppositifolia**—the *gidardak* or Jackal's vine — 16

Dakra, a substance said to be used in Nepal to poison elephants It is made up in balls along with rice *Dakra, dhakka,* &c, are names given to **Elæodendron Roxburghii,** the bark of which is a virulent poison, and **Cissampelos Pareira** is said to be the *Dakh nirbisi,* or antidote to *Dakh* The exact nature of the Nepal poison does not appear to have been made known, but it more than likely contains Aconite — 17

Dal, a generic name for split peas, but more especially applied to the split peas of **Cajanus indicus,** the *Arhar ka-dal*, **Phaseolus Mungo** and **P. radiatus** are the *Mung-ka-dal,* while **Cicer arietinum** (gram) is the *Channa-ka dal,* and **Lens esculenta** the *Masur-ka-dal* — 18

DALBERGIA, *Linn, Gen Pl, I, 544*

monosperma. These are the species which, in the *Flora of British India,*

Dalbergia cana, *Grah, Fl Br. Ind, II, 237,* Leguminosæ — 19

TIMBER. 20

of a very coarse fibre, soon attacked by xylophages" (*Kurz, For Fl. Burm, I, 344*)

D. cultrata, *Grah, Fl Br Ind, II, 233* — 21

Vern —*Yendike, yindaik, veng-daik,* Burm

The Blackwood.

References.—*Kurz, For. Fl. Burm., I., 342; Gamble, Man. Timb., 128; Indian Forester, I., 120; VI., 125; VIII., 416; Balfour, Cyclop., I., 878.*

Habitat.—A moderate-sized tree of Burma (Prome), in general habit resembling **D. lanceolaria**, especially in the character of the pod. **Kurz** says it is common in all leaf-shedding forests, especially in the upper mixed savannahs and *Eng* forests, all over Burma from Ava to Martaban, and down to upper Tenasserim.

RESIN. 22

Resin.—Exudes a red resin according to **Kurz.** **Mr. M. H. Ferrars** says that the Karenis use the plant for the propagation of lac.

OIL. 23

Oil.—**Balfour** states that this tree furnishes a useful oil.

TIMBER. 24

Structure of the Wood.—Purplish-black, with darker streaks, harder than, but in structure similar to, that of **D. latifolia.** Weight 83lb a cubic foot. The sapwood is pale-coloured, turning pale brown, very perishable; the heartwood blackish and ebony-like, often streaked red on a paler ground, extremely durable.

DOMESTIC. 25

It is employed for wheels, agricultural implements, handles of *dahs* and spears, but especially for carving.

26

Dalbergia (Drepanocarpus) Cumingii, *Bth.;* as in *Kurz, For. Fl. Burm., I., 336.*

Habitat.—A tree-like scandent shrub, met with in Tenasserim.

DYE. 27

Dye.—**Kurz** says this "is a dye-wood, and furnishes the *Kayu lakka* of commerce." The writer can discover no other reference to this plant than that given by **Kurz.** It is not described apparently in the *Flora of British India.* **Gamble** (*Man. Timb., 124*) simply repeats **Kurz's** words.

28

D. foliacea, *Wall.; Fl. Br. Ind., II., 232.*

Vern.—*Tatebiri*, NEPAL.

References.—*Kurz, For. Fl. Burm., I., 347; Gamble, Man. Timb., 129.*

Habitat.—A large, straggling shrub, met with in the Eastern Himálaya and Burma (according to **Gamble**); the *Flora of British India* mentions only Ava, Pegu, and Martaban.

TIMBER. 29

Structure of the Wood.—White, porous, with a small, dark heartwood, in structure resembling that of **D. stipulacea,** except that the medullary rays are broader (*Gamble*).

30

D. glomeriflora, *Kurz; Fl. Br. Ind., II., 236.*

Habitat.—A tree 30 to 40 feet in height, found occasionally in the upper mixed forests of the Prome Yomah, at 1,000 to 2,000 feet elevation. It flowers in March and April (*Kurz, For. Fl. Burm., I., 345*).

31

D. hircina, *Benth.; Fl. Br. Ind., II., 236.*

Vern.—*Saras, bandir, tantia, gogera,* N.-W. P.; *Bakalpattia, tantia,* KUMAON.

References.—*Brandis, For. Fl., 151; Gamble, Man. Timb., 124; Indian Forester, XI., 3; Atkinson, Him. Dist., 309.*

Habitat.—A small tree of the Central and Eastern Himálaya, from Garhwál and Kumáon to Bhután, ascending from the foot of the hills to altitudes of 5,000 feet. Flowering season April to May, the seeds ripening in July.

32

D. lanceolaria, *Linn.; Fl. Br. Ind., II., 235.*

Syn.—D. FRONDOSA, *Roxb.;* D. ZEYLANICA, *Roxb.;* D. ARBOREA, *Heyne;* D. ROBUSTA, *Wall;* D. HIRCINA, *Wall.*

Vern.—*Takoli, bithúa,* HIND.; *Chakemdia* (in Puri), BENG.; *Piri,* KOL.; *Chapot siris,* SANTAL; *Bander siris,* NEPAL; *Takoli, bithúa,* N.-W. P.,

Passi, RAJ, MERWARA, *Dandous*, SIND, *Takoli, harrani, gengri*, BOMB, *Harrani*, DHARWAR, *Dandashi*, THANA, *Dandous, kaurchi, dandusa*, MAR, *Barbat, parbati*, BANSWARA, *Gengri*, PANCH MEHALS, *Nal valanga*, TAM, *Erra pachchâri, pedda sôpara yerra patsaru, pasargannı*, TEL, *Vel urruvai* (TAM in Ceylon), *be lulabba* (*Roxb*), SING

Re [illegible]

Forests

Habitat — A deciduous tree of the sub-Himalayan tract, from the Jumna eastwards, ascending to 2,500 feet, also met with in Central and South India, and Bombay Kurz does not ment on it as met with in Burma, but the Conservator of Forests in Bengal reports that though scarce this small tree occurs in the Puri District

OIL. Seed. 33

Oil —The OIL expressed from the SEED is sa d to be used in rheumatic affections "The MILK which exudes from the ROOT is occasionally applied to ulcers" (*Drury*)

Root. 34

MEDICINE. Bark. 35 Leaves. 36

Medicine.—Drury says that "the BARK in infusion is given internally in dyspepsia, and the LEAVES are rubbed over the body in cases of leprosy and other cutaneous diseases" That information, he remarks, is derived [illegible] nd the passage referred to in Rox- [illegible] ry was in reality compiling from [illegible] ich is Pongamia glabra, the seeds [illegible] skin affections Beddome, however, states that "the BARK and an OIL obtained from the SEEDS are in use medicinally with the natives" The Revd A Campbell writes that the Santals use the bark along with that of Flacourtia Ramontchi, as an external application, during intermittent fever The leaves and the ROOT, he adds, are also employed medicinally

Seeds. 37

Root. 38

TIMBER. 39

Structure of the Wood —White, moderately hard, not durable, no heartwood Weight 62lb per cubic foot Beddome says the timber is useful for building purposes In the *Bombay Gazetteer* (Konkan), it is stated that the wood is used for the handles of tools and small agricultural implements Roxburgh observes that it is a quick growing, large, beautiful tree, the timber of which is useful for many purposes Similarly, Balfour reports that it affords a strong and useful timber

Dalbergia latifolia, *Roxb ; Fl Br Ind, II, 231*

40

THE BLACKWOOD OR ROSEWOOD OF SOUTHERN INDIA

Syn —D EMARGINATA, *Roxb*

41

Var. **sissoides** is said, by the *Flora of British India*, to occur on the Nilgiri hills It differs from the normal condition in having the leaflets rather narrower in proportion to their length and somewhat obtusely pointed It is the D. sissoides, *Grah*, and the D javanica, *Miq* Beddome writes, however, that this form is common in the forest about Coimbatore and at Palghât, on the Anamallays, at Madura and Tinnevelly He adds "the wood is generally of a redder colour, and the tree flowers in the rainy season (July) instead of in the hot weather; it is always distinguished by the Palghât axemen as the *ecruputu*, while D latifolia is called *eetee* (Dr Wight apparently transposes these native

India, and parts of Bengal, Sikkim, and the Andaman Islands" "It is not found in Ceylon, nor I believe in Burma It ascends the mountains to nearly 4,000 feet, and grows equally well in the dry deciduous forests with teak, and in the moist evergreen sholas, and it is often associated with bamboo" "It flowers in March and April" It may be raised from

in the deciduous forests of Coorg, the wood selling in the forests for 5 to 6 annas a cubic foot.

Gum.—The tree is said to yield a GUM (*E. A Fraser, Assistant Agent to Governor General, Rajputana*)

GUM. 42

OIL Seeds. 43

signed to this species.

Fodder.—Mr Shuttleworth (Conservator of Forests, Bombay) reports that the LEAVES are used as FODDER. Mr Lisboa (quoting from Brandis) remarks that this is the case in Oudh, but he makes no mention of the

FODDER. Leaves 44

TIMBER. 45

forests of Kanara and Malabar Wood sent to London for sale in 1878

stated: "the timber is one of the most valuable in India, is strong, very hard, close grained, and of a purple black. It takes a beautiful polish and is reckoned the best furniture wood A seasoned cubic foot weighs 50lb" In the *Lahore Gazetteer* it is stated that a fair sized tree will fetch from R40 to R70 Kurz says the heart-wood is greenish or greyish black and often mottled or lighter veined Used extensively in India for cabinet-work, knees of vessels, agricultural implements, combs, &c. In Trichinopoly vases and other ornamental articles are made of the wood. It is

Furniture

Combs. 46

Vases. 47

TIMBER.

sometimes called Indian rose-wood from the resemblance when polished to the timber of that name. The planks of black-wood have one great defect—a tendency to split longitudinally when not well seasoned. Beddome remarks of the wood: "it differs much in colour, but is generally purple-black; it admits of a very fine polish, and is our best furniture wood, and is extensively used for gun-carriage purposes." "It generally fetches a higher price than teak." Roxburgh says Bengal-grown timber is "not so heavy as that obtained on the coast of Coromandel and Malabar, though fully as beautiful." Wight states that the Madras plant more closely corresponds with Roxburgh's **D. emarginata** than **D. latifolia**, "but the wood of the former is not black, which I think fatal to their identity. It is possible, however, that the Malabar tree may be specifically distinct from the Bengal one." Wight also states that planks, often 4 feet in diameter, are obtained from Malabar, and that too after all the white external wood has been removed. Roxburgh alludes to a tree 20 feet in circumference.

Dalbergia Mooniana, *Thwaites*; see **Pericopsis Mooniana**, *Thwaites*; *Fl. Br. Ind., II., 252.*

48

D. (Drepanocarpus, *Kurz*) **monosperma**, *Dalz.; Fl. Br. Ind., II., 237.*

Syn.—D. PANICULATA, *Wall.*; D. TORTA, *Grah.*

Habitat.—Shores of the Western Peninsula, Ceylon, and the Malayan Peninsula (*Fl. Br. Ind.*). Tidal jungles of Upper Tenasserim (*Kurz*). A scandent bush with hooked branches (Conf. with *Gamble, Man. Timb., 124; Dalz. & Gibs., Bomb. Fl., 78*).

49

D. nigrescens, *Kurz, For. Fl., I., 346.*

Vern.—*Thitsanweng* or *thitsawnwin*, BURM.

References.—*Kurz, For. Fl. Burm., 346; Gamble, Man. Timb., 129.*

Habitat.—A moderate-sized deciduous tree, of the dry mixed forests of Upper Burma. Leaves small, blunt or retuse, panicles dense or compact, pedicles short. The name is given on account of the leaves turning black on being dried.

TIMBER. 50

Structure of the Wood.—Light-grey, soft; weight 38lb a cubic foot.

There is some doubt about the identification of these species owing to the absence of concentric bands (*Gamble*). It is not referred to in the *Flora of British India*.

D. ougeinensis, *Roxb.*; see **Ougeinia dalbergioides**, *Benth.; Fl. Br. Ind., II., 161.*

51

D. ovata, *Grah.; Fl. Br. Ind., II., 231.*

Syn.—D. GLAUCA, *Wall.*

Vern.—*Madama* (Kurz), *douk-ta-louk* (Mason), BURM.

References.—*Kurz, For. Fl. Burm., 343; Mason's Burma, 530, 769.*

52

Var. **obtusifolia**.—A form with leaflets 3-5 inches long, oblong, obtuse, emarginate; found in Burma.

Kurz regarded **D. ovata**, *Grah.*, as distinct from **D. glauca**, *Wall*, thus restoring two species which, in the *Flora of British India*, were reduced to one. Of **ovata**, he says, the leaflets are acuminate, and to **glauca** he assigns the characters given above to the variety **obtusifolia**. The writer prefers following the *Flora of British India* in all matters of synonymy, since he has no means of examining the plants and of thus forming a personal opinion.

Dalbergia paniculata, *Roxb*, *Fl Br Ind*, *II*, *236*

53

Vern —*Dhobein dhohein passi, satpuria* HIND, *Pondri* KOL, *Surteli*,

References —

Habitat —A large, deciduous tree according to Gamble met with in the North-West Himálaya from the Jumna to Oudh, Central and South India (quoted by Kurz as met with in Burma, but identification doubtful) By the *Flora of British India* Western Peninsula" Brandis entral India, Gonda forests of ascending to 2,500 feet" He adds "the leaves are shed in February-March, the new foliage comes out in April and May, with the flowers" Beddome remarks "This

pieces"

GUM. 54

Gum.—The tree is reported to yield a GUM

TIMBER. 55

Structure of the Wood —Yellowish or greyish white, soft, perishable, no heartwood Structure most remarkable, entirely different from that of ses of wood alternate ance, resembling the ne attacks of insects Beddome 60lb un- gravity 768 Rox- but less useful than is used for building and other purposes It affords useful fire-wood. Kurz affirms that it is "good for common household purposes"

In the *Indian Forester* (XIV, 421) an interesting note is given by the Editor on a sample of coppice shoot furnished by Mr. S C Moss, Sub Assistant Conservator, Tinnevelly, "which shows a coppice shoot springing from the zones of soft tissue between two of the concentric layers

TIMBER.

of the wood: in one specimen the shoots are from close to the centre of the stem. The stumps were 12 inches in radius, and the concentric rings vary from half an inch to a whole inch in thickness. In the case of shoots springing from near the centre of the stem, the latter appears to have been decomposed at the centre, and the shoot, which may have originated in a layer of soft tissue, has passed radially across three zones of harder and two of softer tissue. This discovery of Mr. Moss' appears to be a new one in vegetable physiology, as adventitious shoots generally spring from the cambium zone, or directly between the wood and bark."

DOMESTIC. 56

Domestic Uses.—Leaves and twigs are used to manure fields in Madras (*Ind. For., IX., 357*).

57

Dalbergia purpurea, *Wall.; Fl. Br. Ind., II., 235.*

A scandent species allied to D. LANCEOLARIA.

Vern.—*Thitpôt,* BURM.

Habitat.—Martaban and Pegu: common in the mixed forests down to Upper Tenasserim.

TIMBER. 58

Structure of the Wood.—Sap-wood light, not much used: heart-wood black and ebony-like (*Kurz, For. Fl. Burm., I., 344*).

59

D. reniformis, *Roxb.; Fl. Br. Ind., II., 238; Wight, Ic., t. 261.*

Syn.—D. FLEXUOSA, *Grah.*; D. STIPULATA, *Wall.*; DREPANOCARPUS RENIFORMIS, *Kurz, For. Fl. Burm., I., 336* (see the note above under the genus DALBERGIA).

Vern.—*Tankma* (Kurz) and *Douk-loung* (Mason), BURM.; *Kures,* SYLHET (Roxburgh).

References.—*Roxb., Fl. Ind., Ed. C.B.C., 534; Mason's Burma and Its People, pp. 530 and 769.*

Habitat.—A large, crooked, bushy tree "common in the swampy forests of Pegu and Martaban down to Upper Tenasserim; flowering in February and March, and the fruit ripening in April and June" (*Kurz*). The *Flora of British India* adds that it is found in "Sillet." Roxburgh says that in Sylhet it flowers in March and the seeds ripen in December.

TIMBER. 60

Structure of the Wood.—White, turning yellow, coarsely fibrous, light, very perishable.

DOMESTIC. 61

Domestic Uses.—Roxburgh states that "the wood yields a greenish flame, and is reckoned the best for burning limestone."

62

D. rimosa, *Roxb.; Fl. Br. Ind., II., 232; Wight, Ic., t. 262.*

Vern.—*Kaogrum,* SYLHET.

Habitat.—A shrubby species, met with in the tropical zone of the Eastern Himálayas, ascending to 4,000 feet—Khásia hills, Sylhet, Assam. Brandis (on the authority of Stewart) says that it is also met with in the Siwalik tract and outer Himálayas west of the Jumna. Reported to be cultivated in Bangalore (*Mysore Gas.*). (Conf. with *Gamble, Man. Timb., 124; Brandis, For. Fl. N. Ind., 148; Roxb., Fl. Ind., Ed. C.B.C., 536.*)

D. robusta, *Roxb.*; see Derris robusta, *Benth.; Fl. Br. Ind., II., 241.*

63

D. rubiginosa, *Roxb.; Fl. Br. Ind., II., 232.*

Vern.—*Karra sirli, tella tige,* TEL. Sir Walter Elliot remarks that Roxburgh's name *tella tige* simply means "white climber."

Habitat.—A scandent species, to be distinguished from D. monosperma by the character of the stamens and ovary; acording to the *Flora of British India* it is met with in the Western Peninsula. Roxburgh's locality

for it was the Circar mountains It is described by Mr Talbot as occurring in Kanara

Dalbergia scandens, *Roxb*, see Derris scandens Sir Walter Elliot remarks that this is the *Chiratala bodi* and the *surli* in Telegu *Rheede, VI, 22*

D. Sissoo, *Roxb*, *Fl. Br Ind, II, 231.*

64

THE SISSOO

Vern —*Shisham, sissu sissai, sisam, sisu,* HIND, *Shisu* (*Sisu* by U C Dutt), BENG *Sissu*, ASSAM, *Sisu*, URIYA, *Sissai*, OUDH, *Sisu*, N W P, *Tali* or *tahli safeda shin, nelkar shisham, shishai, shia shewa*, PB, *Shewa* (Gamble, Stewart), *Zagar* (Lace), PUSHTU, *Shawa* or *shewa* (PUSHTU) in Bannu and Peshawar Districts, *Shisham* (MERWARA) RAJ, *Sissu, tali*, SIND, *Sissu*, BOMB, *Tanach, sisam*, GUZ, *Yette, nukku kattai*, TAM *Sissu, karra*, or *sissu karra* (*sissu* by Elliot), TEL, *Biridi, etshmabage*, KAN, *Sinsapa* (U C Dutt), *shingshupa* (Roxburgh), SANS, *Sasam, sasim*, ARAB
Dr Moodeen Sheriff [illegible]

References.—*Roxb, Fl Ind Ed C B C 533 Brandis, For Fl, 149 Beddome, Fl Sylv, t 25 Gamble Man Timb, 124, Dalz & Gibs, Bomb Fl, Suppl, 25 Stewart Pb Pl, 65, Aitchison, Cat Pb and Sind Pl, 50 Sir W Elliot, Fl Andh, 168, Dr Stock, Report on Sind; Moodeen Sheriff, Supp Pharm Ind, 129, U C Dutt, Mat* [illegible]

[illegible] *Indian Forester, III, 45, IV, 321, 360, 360, 411 V 180 IX, 75, 92, 490, X, 60, 402 XII, app 1, 27; XIII, 55, 339 XIV, 159, 199,* [illegible]

[illegible] *t Conserv, Forests, Trans Agri Hort Soc Ind, VII 129, an account of the tree in Cuttack*
[illegible]

of its localities, however, being the result of the effort to extend its cultivation It is probable that its indigenous habitat is very much narrower than we are accustomed to think Neither Kurz nor Mason make any

mention of its occurrence in Burma. **Roxburgh** regards it as a native of Bengal "and of the adjoining provinces to the northwards." **Brandis** views it as a native of the sub-Himálayan tract, and adds "generally gregarious, mostly on sand or gravel along the banks of rivers or on islands extending 50 to 100 miles into the plains. Believed to be indigenous also in Guzerat, Baluchistan, and Central India. I have never seen it really wild outside the sub-Himálayan belt. Cultivated and often self-sown *throughout India: thrives best on light soil,* and requires a considerable amount of moisture. The old leaves turn reddish brown and begin to fall in December, but continue to be shed up to February, when the young foliage comes out, continuing till April." "Flowers from March to June, at times with a second flush between July and October; the seed ripens from November to February, and generally remains long on the tree." **Beddome** says it only occurs as an avenue tree in the Madras Presidency.

Mr. J. H. Lace, Assistant Conservator of Forests, Quetta, who has given much careful study to the plants of Baluchistan, says: **D. Sissoo** is "indigenous about the Harnai, the Mehrab-Tangi, and up to Sharigh (4,000 feet). The Wam Tangi Forests near the Harnai is chiefly composed of it, where it grows up to 35 feet in height." **Mr. Mann,** Conservator of Forests, Assam, says: "It occurs naturally only in the Eastern Duars of the Goalpara District in Assam. With the exception of a few scattered trees in the Lakhimpur District up stream from Dibrugarh, no Sissu is found in the Cachar or Sylhet Districts." The Assistant Conservator of Forests, Ajmere-Merwara, writes that while **D. latifolia** and **D. lanceolaria** are wild, **D. Sissoo** is cultivated. The Conservator of Forests says, it is cultivated in Sind, and that plantations, 20 years old, exist. It requires a good soil and care during its first year or two. **Stewart** regards it as indigenous in the Kachhi Forest, Panjáb, on the islands of the Indus opposite Bannu. The Conservator of Forests, Northern Circle, Madras (in a report forwarded through the Board of Revenue) says that "Sissu is only found in cultivation in the Madras Presidency. It does well on river banks as in the plantations on the Cauvery in Trichinopoly and fairly well on coast stands as at Musulipatam."

OIL. Wood. 65 Seeds.

Oil.—The WOOD is said to yield an empyreumatic, medicinal OIL. In a recent report from the Forest Department, North-Western Provinces, it is stated that oil is expressed from the SEEDS.

MEDICINE. Raspings. 66 Root 67 Leaves 68 Oil. 69 Mucilage. 70 Decoction. 71 Bark. 72

Medicine.— The RASPINGS of the wood are officinal, being regarded as alterative (*Beddome*). "It is considered by natives to be hot (*Stewart*). Useful in leprosy, boils, eruptions, and to allay vomiting: also in special diseases" (*Baden Powell*). The ROOTS are said to be so astringent that they are neither eaten by rats nor ants. "The LEAVES and saw-dust (raspings) in decoction are esteemed in eruptive and special diseases, and to allay vomiting. The OIL is also applied externally in cutaneous affections" (*Atkinson, Himálayan Districts*).

SPECIAL OPINIONS.—§ "The MUCILAGE of the leaves mixed with sweet oil is a good application in cases of excoriation. A DECOCTION of the leaves is given in the acute stage of gonorrhœa" (*Civil Surgeon J. Anderson, M.B., Bijnor*). "The BARK made into pills with aromatics such as ginger, &c, checks cholera" (*V. Ummegadien, Mettapollium, Madras*).

FODDER. 73

Fodder.—The young trees are liable to be browsed by cattle, goats, and camels (*Stewart*); but the arrangements for forest conservation prevent this as much as practicable.

TIMBER. 74

Structure of the Wood.—Sapwood small, white; heartwood brown with darker longitudinal veins, close and even-grained, seasons well, very hard. Annual rings not distinctly marked, alternating dark and light-coloured bands, which run into each other.

TIMBER

The wood is very durable, seasons well, and does not warp or slip It is highly esteemed for all purposes where strength and elasticity are required Clifford says that "in strength it is only inferior to *sal*, while in many other useful qualities it surpasses it, and has the advantage of being lighter For FELLOES and NAVES of wheels and carved work of every description, for framings of carriages and similar work, it is un surpassed by any other wood, owing to its fine seasoning and standing

Felloes. 75
Naves 76

Ship building 77
Gun-carriages 78

RIAGES than it can be at present, owing to the comparatively small supply With regard to its durability and strength as a wood for wheels, Clifford writes "The WHEELS of our ordnance carriages have never failed, have than world went ain to India without a break-down while Royal Artillery wheels, built of the very best materials Woolwich could produce, specially for Indian service, almost fell to pieces after a few months' exposure and service on the plains of India"

Wheels. 79

It has been tried and found to be good for SLEEPERS and Mr Mc-Master, in the *Proceedings of the Institution of Civil Engineers*, Vol XXIII, 1863, says it will be really good for that purpose The wood makes excellent CHARCOAL Stewart recommended the cultivation of the tree for the purpose of railway FUEL, and Mr Baden Powell, while Conservator of Forests in the Panjab planted out large tracts of country for this purpose It is much planted as an AVENUE tree all over India and in forest plantations in the Panjáb and Bengal At the Colonial and Indian Exhibition Conference on timbers, Sir D Brandis is reported to have said. "The tree is chiefly found along the streams which emerge from the Himálaya Large trees became scarce about 60 years ago, but the tree is now regularly and extensively planted An exhaustive report was prepared in 1826 by an eminent botanist, Dr Wallich, respecting the localities producing the *Sissu*, which showed that the supply of large timber was at that time nearly exhausted *Sissu* can, however, be easily cultivated in India, and on a large scale, in fact almost as easily as Spruce in Europe Very extensive plantations have already been formed, and they could be extended over a great area if a sufficient demand arose for the timber The tree has, for example, been young to

Sleepers. 80
Charcoal and Fuel. 81
Avenue Tree. 82

viewed by them as sacred

SACRED 83

Dalbergia spinosa, *Roxb*, *Fl Br Ind*, *II*, *238*

84

Syn—D HORRIDA, *Grah*, DREPANOCARPUS SPINOSUS, *Kurz*, *For Fl Burma*, *I*, *337*

Vern—*Yechinya* BURM

Habitat.—A stiff erect shrub with the branches spine-tipped, frequent on the shores of the Eastern and Western Peninsulas and at Chittagong

MEDICINE. Roots. 85

Medicine.—"The ROOTS powdered absorb alcohol, and a spoonful of the powder in a tumblerful of water is said to be sufficient to destroy in less than half an hour the effects of alcohol even in cases bordering on delirium tremens" (*Kurz*).

TIMBER. 86

Structure of the Wood.—"Soft, beautifully silvery white, close and straight-grained" (*Kurz*).

87

Dalbergia stipulacea, *Roxb.; Fl. Br. Ind., II., 237; Wight, Ic., t.* [453.

Syn.—D. FERRUGINEA, *Roxb.*; D. TINGENS, *Wall.*; D. CASSIOIDES, *Wall.*; D. LIVIDA, *Wall.*; D. ROSTRATA, *Grah.*

Vern.—*Tatebiri*, NEPAL; *Tón-nyok*, LEPCHA; *Garodosal*, MICHI; *Dauk talaungnwi*, BURM.

References.—*Kurz, For. Fl. Burm., 346; Gamble, Cat. Darj. Pl., 29, 129.*

Habitat.—A large, climbing shrub of the Eastern Himálaya, ascending to 4,000 feet; also of Assam, the Khásia Hills, Chittagong, and Burma.

TIMBER. 88

Structure of the Wood.—Soft, greenish-grey, hard, close-grained, very prettily marked with lines of different colours. Weight 48lb a cubic foot.

89

D. sympathetica, *Nimmo; Fl. Br. Ind., II., 234.*

Syn.—D. FRONDOSA, *Wall.*; D. FERRUGINEA, *Hohen.*

Vern.—*Petaguli* or *pentgul, titávali, yakayela*, MAR.; *Titábli*, GOA.

References.—*Dalz. & Gibs., Bomb. Fl., 78; Dymock, Mat. Med. W. Ind., 2nd Ed., 236; Bomb. Gaz. (Kanara), XV., I., 433.*

MEDICINE. Bark. 90

Habitat.—A scandent plant armed with large curved thorns, frequent on the hills of Western India. Dymock says it is common near Bombay, and Talbot that it is found at Kanara.

Leaves. 91

Medicine.—The BARK is used as a *lép* to remove pimples. The LEAVES are in Goa employed as an alterative (*Dymock*).

92

D. tamarindifolia, *Roxb.; Fl. Br. Ind., II., 234; Wight, Ic., t. 242; Roxb., Fl. Ind., Ed. C.B.C., 53; Gamble, Man. Timb., 124.*

Syn.—D. LIVIDA, *Wall.*; D. MULTIJUGA, *Grah.*; D. BLUMEI, *Hassk.*; DERRIS PINNATA, *Lour.*

Vern.—*Keti*, SYLHET; *Damar*, NEPAL.

Habitat.—A scandent species met with in the Eastern Himálayas—Nepál, Sikkim, Sylhet, the Khásia Hills, &c., ascending to 4,000 feet. Kurz says it is not unfrequent in the Andaman Islands and in Tenasserim (*For. Fl. Burm., I., 348*). Talbot reports its occurrence in the forests of Kanara.

FODDER. Leaves. 93

Fodder.—The LEAVES resemble those of the tamarind and are eaten by cattle.

94

D. volubilis, *Roxb.; Fl. Br. Ind., II., 235.*

Vern.—*Bhatia, bankhara*, HIND.; *Bir munga, nari siris*, SANTAL; *Nub-ari*, URIYA; *Rongdi*, MAL. (S.P.); *Bhatia*, KUMAON; *Alei, alai*, MAR.; *Bandigarjana, bandi guriginja* (Elliot doubts the correctness of these names), TEL.

References.—*Roxb., Fl. Ind., Ed. C.B., 536; Brandis, For. Fl., 152; Kurz, For. Fl. Burm., 346; Elliot, Fl. Andh., 22; Dymock, Mat. Med. W. Ind., 2nd Ed., 237; Indian Forester, X., 326; Gaz., N.-W. P. (Bundelkhand), 80; Himálayan Districts, 309; Bomb. Gaz., XV., I. (Kanara), 433.*

Habitat.—A large climber, met with in the Central and Eastern Himálaya, Oudh, Pegu, and Ceylon. The Conservator of Forests, Bengal, in a recent report, states, however, that it also occurs in Orissa.

MEDICINE. Root-Juice. 95

Medicine.—Dymock states that it is applied to aphthæ and is used as a gargle in sore-throat. The ROOT-JUICE with cummin and sugar is given in gonorrhœa.

Dammar. (G Watt) DAMMAR

FODDER 96

Fodder.—According to the Rev A Campbell cattle and goats eat the leaves of this plant

TIMBER.

Structure of the Wood—Light-brown, hard, very tough

97

Dalchini, see **Cinnamomum Tamala, C. 1183.**

98

Dalima, a name given in Orissa to a hard stone employed for making utensils, &c

Damasonium indicum, see **Stratiotes alismoides,** *Linn*

99

Dammar.—A trade generic name for a series of resins separately

East Indian. 100

Amboyna Pine 101

Kauri. 102

Sal 103

Black. 104

Department of the Government of India in a special report derived from correspondence with the Local Governments This report appeared in 1871, and the following pages deal with Black Dammar —2, 3, 4, 6, 7, 8, 9, 10, 13, 23, 30, and 69

Rock. 105

5th, Rock Dammar—This is obtained from two species of **Hopea,** *viz*, **H odorata,** a native of Burma, and **H. micrantha,** a native of Malacca, Borneo, and Sumatra, &c.—(See **Hopea.**)

White 106

6th, White Dammar or Dhoop resin—This name is often applied to the first Dammar enumerated above, but also to the resin derived from **Vateria indica,** which see

Green. 107

7th Green Dammar— A term given to the resin of **Shorea Tumbuggaia,** which see

Pwenyet. 108

8th, Pwenyet (or Poon-yet) Dammar—A resinous or waxy substance obtained from certain trees in Burma It is the hive of a peculiar bee, but much doubt exists as to the true nature and source of the substance See **Pwenyet** in this work, and also **Dr Forbes Watson's** account of it in the report on Gums and Gum-resins published by the India Office (1874), page 95

In the countries where they are obtained, the dark coloured and impure dammars are used for
purer qualities are exported
their specific properties, the
are, however, employed as v
to give a gloss to cotton anc
as varnishes by coach-builc
is that known in the trade
dammar derived from Dar
comes from New Zealand
Zealand average between 2,500 and 6,000 tons annually, the larger quantity either going direct or *via* London to the American market

DAMMARA, *Lamb.; Gen. Pl., III., 436; Fl. Br. Ind., V., 650.*

Lambert (*Genus Pinus, smaller edition*) accepted Salisbury's position in separating the species of Dammar from the genus PINUS; he, however, preferred the name Dammara, *Rumph.*, to Agathis, *Salisb.*, the result being that Dammara has become better known. In a work like the present, which is more or less of a commercial character, it has been thought desirable to preserve the older name Dammara, and as Agathis has not been dealt with in the first volume of this work, it becomes all the more necessary to give the economic information in the present place. The *Flora of British India* adopts Agathis in preference to Dammara.

109

Dammara australis, *Lamb.; Genus Pinus, t. 54.*

THE KAURI PINE.

Syn.—AGATHIS AUSTRALIS, *Salisb.*

References.—*Gordon, Pinetum, 108; Gamble, Man. Timb., 394; Indian Forester, III., 177, 184; V., 104; VII., 363; XII., 476, 553; Mysore and Coorg Gaz., I., 66; Smith, Dict. Econ. Pl., 149; Royle, Productive Resources, 68; Mueller, Extra-Tropical Pl., 102; Beddome, Fl. Sylv., 227; Trans. Agri-Hort. Soc., V., 110; VI., 103—105.*

Habitat.—A native of New Zealand, now confined to the North Island, but formerly more extensively distributed. Cultivated in most tropical and sub-tropical countries. The tree is being experimentally cultivated in India, but apparently not with the vigour which the importance of the subject deserves. Royle alludes to a consignment of 353lb of seed of Dammar having been consigned to India in 1796, and in Mysore the descendants (presumably) of this stock may still be seen. Beddome alludes to Dammara as represented on the mountains of Madras.

RESIN. 110

Resin.—In the above remarks regarding Dammar resin some of the main features of the trade have been indicated. In Lambert's work, quoted above, is reproduced Rumphius' interesting article on the subject, one of the most important which has as yet appeared. Some idea of the value of the resin may be obtained from the fact that the imports into Great Britain are stated to have been worth £200,000. The tree is rapidly being exterminated in New Zealand, as its timber is of great value, and it is problematic how long the supply of fossil resin will continue to meet the growing demand. The tree attains a height of 120 to 150 feet, with a circumference of 24 feet.

111

D. orientalis, *Lamb.; Genus Pinus, t. 55.*

THE AMBOYNA PINE.

Syn.—D. ALBA, *Rumph.*; AGATHIS LORANTHIFOLIA, *Salisb.*; *Fl. Br. Ind., V., 650.*

Vern.—*Theet-men* (according to Mason), BURM.

Habitat.—A large tree, native of Amboyna, and Ternate, of the islands of Molucca, Java, Borneo, &c. Mason, in his list of the plants of Burma, enumerates this species, but Kurz makes no mention of it. Wallich states that it is found in Tavoy, and the *Flora of British India* that it is a native of Penang and Perak.

RESIN. 112

Resin.—The timber is of little value, but the tree affords large quantities of a transparent resin known as Dammar. This is conveyed to most parts of the world, being used in India as incense and for medicinal purposes. In Europe it is largely used like the resin of the above species for purposes of varnishing and for waxing or polishing fabrics. (*O'Shaughnessy, Beng. Disp., p. 617.*)

It seems probable that th s spec es m ght w th great ease be gro n n Burma and poss bly also in the Andaman Islands

Damson, see Plum and also Prunus communis *Huds*

D -- o g ven to many ... rantus *Shakar* ... ns *Hazardan* 113

Dandelion, see Taraxacum officinale *Wiggers* COMPOSITÆ

Dandy, Banghy and Palanquin Poles Woods used for— 114

These woods are elast c and capable of bear ng a cons derable we ght They m ght accord ngly be employed for cart shafts Dandy poles are used by many races of Ind a to carry loads across the shoulder a pack age be ng balanced at each extrem ty

Acer cultratum
A pictum
Bambusa arund nacea
Betula Bhojpattra
Cotoneaster obtusa
Cupressus torulosa
D ospyros melanoxylon
Ficus bengalens s
F indica
Fraxinus floribunda
Fraxinus xanthoxylloides
Grewia oppos tifolia
G tiliæfolia
G vestita
Lagerstræmia parviflora
Quercus dilatata
Q semecarpifolia
Taxus baccata
Ulmus campestris

Danewort, see Sambucus Ebulus

DAPHNE, *Linn* *Gen Pl III*, *190*

Daphne cannabina, *Wall* *Fl Br Ind V* *193* THYMELÆACEÆ 115

POPULARLY kno vn as the NEPAL PAPER PLANT

Syn —DAPHNE PAPYRACEA *Wall* D ODORA and BHOLUA *Do* D PAPYRIFERA *Ham MS*

Vern —*Set baruwa satpura* HIND *Dunkotah gande kaghut bhullu soang* NEPAL *Daysh ng* BHUTIA *Balwa* or *bhalua chamboi barua* KUMAON *N ggi mahadeo-ka phul* (God s Flowe) *jeku* (SIMLA) PB *Hsele* BURM

Habitat —A large shrub or small tree found on the H malaya from the Indus to Bhután between alt tudes of 3 000 and 10,000 feet also on

DAMMARA, *Lamb.; Gen. Pl., III., 436; Fl. Br. Ind., V., 650.*

Lambert (*Genus Pinus, smaller edition*) accepted Salisbury's position in separating the species of Dammar from the genus PINUS; he, however, preferred the name Dammara, *Rumph.*, to Agathis, *Salisb.*, the result being that Dammara has become better known. In a work like the present, which is more or less of a commercial character, it has been thought desirable to preserve the older name Dammara, and as Agathis has not been dealt with in the first volume of this work, it becomes all the more necessary to give the economic information in the present place. The *Flora of British India* adopts Agathis in preference to Dammara.

109

Dammara australis, *Lamb.; Genus Pinus, t. 54.*

THE KAURI PINE.

Syn.—AGATHIS AUSTRALIS, *Salisb.*

References.—*Gordon, Pinetum, 108; Gamble, Man. Timb., 394; Indian Forester, III., 177, 184; V., 104; VII., 363; XII., 476, 553; Mysore and Coorg Gaz., I., 66; Smith, Dict. Econ. Pl., 149; Royle, Productive Resources, 68; Mueller, Extra-Tropical Pl., 102; Beddome, Fl. Sylv., 227; Trans. Agri-Hort. Soc., V., 110; VI., 103—105.*

Habitat.—A native of New Zealand, now confined to the North Island, but formerly more extensively distributed. Cultivated in most tropical and sub-tropical countries. The tree is being experimentally cultivated in India, but apparently not with the vigour which the importance of the subject deserves. Royle alludes to a consignment of 353lb of seed of Dammar having been consigned to India in 1796, and in Mysore the descendants (presumably) of this stock may still be seen. Beddome alludes to Dammara as represented on the mountains of Madras.

RESIN. 110

Resin.—In the above remarks regarding Dammar resin some of the main features of the trade have been indicated. In Lambert's work, quoted above, is reproduced Rumphius' interesting article on the subject, one of the most important which has as yet appeared. Some idea of the value of the resin may be obtained from the fact that the imports into Great Britain are stated to have been worth £200,000. The tree is rapidly being exterminated in New Zealand, as its timber is of great value, and it is problematic how long the supply of fossil resin will continue to meet the growing demand. The tree attains a height of 120 to 150 feet, with a circumference of 24 feet.

111

D. orientalis, *Lamb.; Genus Pinus, t. 55.*

THE AMBOYNA PINE.

Syn.—D. ALBA, *Rumph.*; AGATHIS LORANTHIFOLIA, *Salisb.*; *Fl. Br. Ind., V., 650.*

Vern.—*Theet-men* (according to Mason), BURM.

Habitat.—A large tree, native of Amboyna, and Ternate, of the islands of Molucca, Java, Borneo, &c. Mason, in his list of the plants of Burma, enumerates this species, but Kurz makes no mention of it. Wallich states that it is found in Tavoy, and the *Flora of British India* that it is a native of Penang and Perak.

RESIN. 112

Resin.—The timber is of little value, but the tree affords large quantities of a transparent resin known as Dammar. This is conveyed to most parts of the world, being used in India as incense and for medicinal purposes. In Europe it is largely used like the resin of the above species for purposes of varnishing and for waxing or polishing fabrics. (*O'Shaughnessy, Beng. Disp., p. 617.*)

It seems probable that this species might with great ease be grown in Burma, and possibly also in the Andaman Islands

Damson; see Plum, and also Prunus communis, *Huds*

Dana—a grain, and especially gram, but the name is also given to many plants, such as the *Anardana*, *Ramd ina*, species of Amarantus, *Shakardana*, Colebrookia oppositifolia; *Behdana*, Cydonia vulgaris; *Hazardana*, Euphorbia thymifolia, *Kaladana*, Ipomœa hederacea, &c.

113

Dandelion; see Taraxacum officinale, *Wiggers*, COMPOSITÆ

Dandy, Banghy and Palanquin Poles, Woods used for—

114

These woods are elastic and capable of bearing a considerable weight They might, accordingly, be employed for cart shafts Dandy poles are used by many races of India to carry loads across the shoulder, a package being balanced at each extremity

Acer cultratum.
A pictum.
Bambusa arundinacea.
Betula Bhojpattra.
Cotoneaster obtusa.
Cupressus torulosa.
Diospyros melanoxylon
Ficus bengalensis
F. indica.
Fraxinus floribunda
Fraxinus xanthoxylloides.
Grewia oppositifolia.
G tiliæfolia.
G vestita.
Lagerstrœmia parviflora.
Quercus dilatata
Q semecarpifolia.
Taxus baccata
Ulmus campestris

Danewort; see Sambucus Ebulus.

DAPHNE, *Linn.*; *Gen. Pl*, *III*, *190*

Daphne cannabina, *Wall*, *Fl. Br Ind*, *V*, *193*; THYMELÆACEÆ.

115

POPULARLY known as the NEPAL PAPER PLANT.

Syn.—DAPHNE PAPYRACEA, *Wall*, D ODORA and BHOLUA, *Don*, D PAPYRIFERA, *Ham MS*

Vern—*Set barúwa, satpura*, HIND, *Dunkotah, gande, kaghuti, bhullu soang*, NEPAL, *Dayshing*, BHUTIA, *Balwa* or *bhalua, chamboi, barua*, KUMAON, *Niggi, mahadeo-ka phúl* (God s Flower), *jeku* (SIMLA), PB, *Hsele*, BURM

References—*Brandis, For Fl, 386, 577, Gamble, Man Timb, 315 Cat of Trees Shrubs, and Climbers of Darjeeling, 67, Stewart, Pb Pl, 188 9, O Shaughnessy, Beng Dispens, 7, 531, Baden Powell, Pb Pr, 515, Atkinson, Him Dist, 378, 514, 795—97, Drury, U. Pl, 178, Royle, Ill Him Bot, 321, Christy, Com Pl and Drug, VI, 12, Royle, Fib Pl, 311, Spons Encyclop, 947, Bal*

Habitat—A large shrub or small tree found on the Himalaya from the Indus to Bhutan, between altitudes of 3,000 and 10,000 feet, also on

the Khásia and Naga Hills; one of the most abundant bushes on the hills between Manipur and Burma.

Gamble remarks that this species blossoms from November to February, and that the fruits ripen and become red in May. He adds that the flowers are "exceedingly sweetly scented" (*List of Darjeeling Trees, &c., p. 67*). Brandis says it flowers in "March and April, also in autumn," but he makes no mention of its being sweetly scented. The synonym **D. odora**, *Don*, would most probably imply that the flowers were scented. In the Simla district this species flowers from the middle of December to the end of February or middle of March, but the flowers are then devoid of any smell. It is probable that under certain circumstances it may have two seasons of flowering, in one of which it may be scented. Most authors describe the plant as "a large shrub," and Brandis says it attains a height of seven to eight feet. In Simla it is one of the most abundant plants, with **Skimmia Laureola** and **Sarcococca pruniformis** forming the forest under-brushwood, but none of these plants much exceed three feet in height.

FIBRE. Bark. 116

Fibre.—The well-known Nepál paper is said to be made from the BARK of this and the other species of Daphne, and of the allied plant, **Edgeworthia Gardneri**. European interest in this paper may be stated to have originated in Lord Auckland's enquiry regarding it in the year 1837. It was of course known to the natives of India for several centuries prior to that date, and official records, on daphne paper, dated 1817, were submitted to His Lordship for inspection. Very little has since been added to our knowledge of the subject, and the reports quoted below were first published about the beginning of the present century.

Setburosa. 117

"The process of making paper from this plant is thus described in the *Asiatic Researches*. After scraping the outer surface of the bark, what remains is boiled in water with a small quantity of oak-ashes. After the boiling it is washed and beaten to a pulp on a stone. It is then spread on moulds or frames made of bamboo mats. The *Setburosa*, or paper shrub, says the same writer in the above Journal, is found on the most exposed parts of the mountains, and those the most elevated and covered with snow throughout the province of Kumáon. In traversing the oak-forests between Bhumtah and Ranigur, and again from Almorah to Chimpanat and down towards the river, the paper-plant would appear to thrive luxuriantly only where the oak grows. The paper prepared from its bark is particularly suited for cartridges, being strong, tough, not liable to crack or break, however much bent or folded, proof against being moth-eaten, and not subject to damp from any change in the weather; besides, if drenched or left in water any considerable time, it will not rot. It is invariably used all over Kumáon, and is in great request in many parts of the plains, for the purpose of writing *misub-namahs* or genealogical records, deeds, &c., from its extraordinary durability. It is generally made about one yard square, and of three different qualities. The best sort is retailed at the rate of 40 sheets for a rupee, and at whole-sale 80 sheets. The second is retailed at the rate of 50 sheets for a rupee, and 100 at wholesale. The third, of a much smaller size, is retailed at 140 sheets, and wholesale 160 sheets to 170 for a rupee" (*Drury, U. Pl., 178.*)

Cartridges. 118

Another early account of Daphne paper and the process of its manufacture is that given by the late Mr. B. H. Hodgson (*Jour. As. Soc. Beng., Vol. I., 8*), then Resident at the Court of Nepál. In describing this industry (which differs but little from that pursued with ordinary paper-making in India), it may suffice to indicate briefly the main features of Mr. Hodgson's account of the process, materials, and manipulation. The reader, however, will find Mr. Hodgson's complete article

FIBRE

reproduced in Atkinson's *Himalayan Districts, page 795*, also in the *Trans Agri-Hort Soc Ind, V., 228-231*

Mr Hodgson says a stone mortar is required and a mallet or pestle of hard wood, proportioned to the mortar and the quantity of bark it is desired to pulp The alkali employed is the ash of oak-wood This is

solution

The boiling is then continued for half an hour, when the alkaline juice will be found to be nearly absorbed and the bark quite soft This is now carried to the stone mortar and beaten with the mallet until reduced to a pulp ... pure water, until ... water when shake ... ut wooden

used for writing on without the aid of any sizing material

Mr Atkinson adds in his more recent account of this paper that it is

a small portion of
whom it was given f
any English made p
which is employed fo
(see Agri-Hort Soc
describes the paper made by the Bhoteahs as strong and almost as

FIBRE.

durable as leather, and quite smooth enough to write on. For office records, he says it is incomparably better than any Indian paper. It is occasionally poisoned by being washed with preparations of arsenic in order to prevent the destruction caused by insects. Many of the books of Nepál, written on this paper, are said to be of considerable age, and the art of making the paper seems to have been introduced about 500 years ago from China, and not from India." "The paper," he continues, "is so pliable, elastic, and durable, that it does not wear at the folds during twenty years, whereas English paper, especially when eight or ten sheets are folded up into one packet, does not stand keeping in this state uninjured for more than four or five years." He then refers to a copy of a Sanskrit work which he inspected, the date of transcription of which was A.D. 1687, or 150 years prior to his writing of it, that it was in a "perfect state of preservation, having all that time withstood the ravages of insects and the wear and tear of use."

The writer had the pleasure recently to receive from **Dr. Gimlette**, Residency Surgeon, Nepál, some interesting facts regarding Nepál economic products and industries. The following passage, as supplementing the facts derived from the earlier writers (briefly reviewed above) may be here taken from **Dr. Gimlette's** account of paper-making:—"This paper, justly celebrated for its toughness and durability, is manufactured from two or three forms of **Daphne** and also from **Edgeworthia Gardneri**, the last mentioned producing the finest and whitest paper. It is manufactured by the cis-alpine Bhotias, who inhabit the mountains between Nepál proper and Thibet. The barks of the different species are generally mixed together, that of **Daphne papyracea** being seldom used alone except for cordage. *Shosho, arbadi, shedbarwa,* or *letbarwa*, are names given by the Bhotias to the **Daphne** shrubs; *Kaghuti, bara kaghuti,* and *chota kaghuti* are names also used, but all seem to be somewhat loosely applied." "The paper sells in the Katmandu bazar at the rate of six annas per twenty-four large sheets." **Dr. Campbell** reported in 1837 that the price was then 160 sheets, per Nepalese rupee, to 400; or from 9 to 13 Company's rupees per maund. The transport to Patna (a distance of 200 miles) he estimated at R1-12, and the price in Patna only a little more than in Catmandoo. This latter fact he explains by the circumstance of there being a monopoly of the sale of paper kept up by the Nepalese Government.

Throughout the greater part of India Daphne paper may be purchased, so that the manufacture by the hill tribes must be very extensive. Around Simla it is not made; indeed, the people seem utterly ignorant of the value of the plant—one of the commonest of wild plants. They prefer to make their ropes from **Grewia oppositifolia**, and alike neglect the **Daphne** and the wild hemp. This seems to be the state of affairs on most of the outer ranges. At Nagkanda (some 40 miles to the north of Simla) the writer came across some men carrying loads of **Daphne** bark, and was told it was being carried to the east where it was made into paper. This fact is in support of Stewart's statement that the Panjáb Himálayan tribes do not make the paper, though it is well known to be extensively made in Kumáon. The Forest Officer of Jaunsar reports that, though the plant is very common in all the forests above 5,000 feet, paper is not made of its bark, but that the local supply used for Patwari maps, &c., is imported from Kumáon. **Mr. G. G. Minniken**, Forest Officer of Bashahr, recently informed the writer that **Daphne cannabina** was not used in his district for paper-making, though it was probably exported to be used as an adulterant.

CHEMISTRY. 119

Chemistry of Daphne.—In the chemical analysis of the *fibres of India*, published by **Messrs. Cross, Bevan, and King, Daphne** is placed

CHEMISTRY.

at the bottom of the list, since it possesses, of all the Indian fibres examined by these gentlemen, the lowest amount of cellulose, namely, 22 3 per cent Chemistry, in the verdict of percentage of cellulose as an indicator of merit, is thus in opposition to practical experience, for, although it would not perhaps pay to export the bark or paper half-stuff of this (or, indeed, of any other plant) to Europe for the paper-making industry, *pure and simple, there can be hardly any room* for doubt but that the **Daphnes** in many respects are the best of all Indian paper materials The chemical test given above may, however, be accepted as demonstrating their unsuitability for textile purposes In *Spons' Encyclopædia* (*Vol I*, *947*) an old report regarding the fibre is reproduced, namely —"The inner bark, prepared like hemp, affords a very superior paper material. The paper made from it is particularly [illegible] able to crack or [illegible] eing moth eaten, or left in water [illegible] request locally for writing deeds and records on, being quite smooth, and almost indestructible" It may, however, be pointed out that the process described above (by means of which the hill tribes manufacture their Daphne paper) is one mainly characterised by the very slight amount of alkali necessary to produce the pulp A crude alkaline ash, with the boiling conducted for only half an hour, and that too in an open vessel, is all that is necessary Such a treatment may not completely reduce the fibre, though it proves sufficient to produce a workable pulp **Messrs Cross, Bevan, and King** urge that the only safe criterion of the merits of a fibre is obtained from [illegible]

[illegible] percentage of cellulose, and thus seems to call for extended research, since chemistry must undoubtedly be able to account for this fact It would almost seem as if the expeditious and wholesale modern methods of paper making, indeed of fibre extraction generally, removed the materials of vascular concretion or disturbed conditions of the ultimate cellulose fibrils that were essential to their strength as textile or paper materials The loss by weight and the injury to strength effected by *a strong boiling alkali, and under a high pressure, does not seem* a conclusive proof that, with some other process, the fibre thus condemned would not be found to possess properties of great merit At all events, Daphne paper, as made in India, will endure for many years under a treatment that, in a few weeks, days, or even hours, would render the modern papers produced in Europe perfectly worthless

[illegible]

13 6 per cent, ash 3 9, loss by hydrolysis, for five minutes, in soda alkali 21 6, for one hour 34 7, amount of cellulose 58 5 per cent, mercerising 16 5, increase of weight on nitration 126, loss by acid purification 8 3, amount of carbon 41 8 per cent It is to be regretted that these chemists did not furnish a similar complete report of **Daphne** so as to allow of comparison They seem to have been so disappointed with the low per-

DAPHNE
Mezereum.

The Nepal Paper Plant

CHEMISTRY

[illegible] Daphne [illegible] Dr Gimlette, [illegible] Daphne cannabina [illegible] D. papyracea [illegible] Edgeworthia Gardneri [illegible] Nepal [illegible] Himalaya [illegible] Edgeworthia [illegible] Daphne cannabina [illegible] Edgeworthia [illegible] (Edgeworthia is [illegible] Daphne involucrata, [illegible])

[illegible] Daphne, [illegible] Daphne [illegible] D. cannabina [illegible]

SACRED. 120

Sacred Uses.—[illegible] Daphne, [illegible]

TIMBER. 121

Structure of the Wood.—White, moderately hard. [illegible]

122

Daphne involucrata, *Wall. Fl. Br. Ind. V., 193.*

Syn.—[illegible] D. Wallichii, [illegible]

Vern.—[illegible], Nepal.

Habitat.—[illegible] Himalaya, the Khasia Hills, Upper Assam, [illegible] Bengal, [illegible] Burma. Gamble says that this species flowers in January and February, and that the fruit, which is black, ripens in May. [illegible] by Stewart nor by Brandis. Gamble, [illegible] between Daphne Wallichii, [illegible] and D. longifolia, *Meisn* [illegible], and [illegible] at the same time the latter does not [illegible] November and December. (*List of Trees, &c., in Darjeeling District, p. 67.*)

FIBRE. 123

Fibre.—[illegible] is used in the manufacture of Nepal paper.

124

D. Mezereum, *Linn.*

MEZEREON, *Eng.*; [illegible], *Fr.*; KELLERHALS, [illegible], *Germ.*; MEZEREO, *It.*; MEZEREON, *Sp.*

Vern.—*[illegible]*, ARAB.; *[illegible]*, PERS.

References.—*Brandis, For. Fl., 384; Gamble, Man. Timb., 315; Pharm. Ind., [illegible]; O'Shaughnessy, Beng. Dispens., [illegible]; Moodeen Sheriff, Supp. Pharm. Ind., 174; Dymock, Mat. Med. W. Ind., 2nd Ed., 673; Fluck. & Hanb., Pharmacog., [illegible]; U. S. Dispens., 15th Ed., 941; S. Arjun, Bomb. Drugs, 118; Murray, Pl. and Drugs, Sind, 103; Irvine, Mat. Med. Pat., 56, 73, 122; Birdwood, Bomb. Pr., 75; Royle, Ill. Him. Bot., 321; Spons, Encycl., [illegible], 1414; Balfour, Cyclop., I., [illegible]; Treasury of Bot., [illegible]; Kew Off. Guide to the Mus. of Ec. Bot., 113; Year Book, Pharm., 1873, 91, 52; 1874, [illegible]; Irvine, 56, 73, 122.*

Habitat.—A deciduous shrub with pink flowers in lateral clusters; native of North-East Europe from Italy to the Arctic regions and east-wards to Siberia, &c. The flowers appear in spring before the leaves, and

are succeeded by red berries. Although it is occasionally met with in Britain, by most writers it is there viewed as an introduced plant.

HISTORY. 125

said to be of Greek and not Arabic origin, and the plant referred to is thought to be the Daphne Mezereum of botanists. At all events, that

Kamela which Irvine and other modern Indian authors refer to Daphne Mezereum is not the Mezereon of European writers. Irvine remarks that "the seeds are imported from Cabul and used as an irritant." In another place he again reverts to the subject of Daphne Mezereum, but calls it the *Mameera,* and states that "this root is like Mezereon and used in the same way." On a still further page, and again under Daphne Mezereum, he gives another account, calling the plant (in the vernacular) by the names of *Uzul-ool* and *Mazrioon.* "The root," he says, "brought from Persia is used as a stimulant sudorific." (*Conf.* with remark under D. oleoides, para MEDICINE). Dr. Dymock (under *Mazariyun*) gives an account of the drug as described by Mir Muhammad Husain, but makes no mention of any drugs sold at the present day in Bombay drug shops under that name. Assistant Surgeon Sakharam Arjun,

Europe

Medicine—

an indigenous

be used as suc

the medicinal ... properties assigned to the drug in Europe. Mezereon, when taken internally, is supposed to be alterative and sudorific, and to be useful in venereal, rheumatic, and scrofulous complaints. Externally applied it is a rubefacient and vesicant, but to obtain the last effect it has to be first steeped in hot vinegar and kept in contact with the skin by means of a bandage.

MEDICINE. *Mazariyun* 126

as an i

daph... An acid ... in the bark of other species of Daphne.

128 CHEMISTRY. 129

CHEMISTRY.

"Umbelliferone has been obtained by dry distillation of the resinous acid of the bark.

"A greenish-yellow oil has been extracted from the Daphne Mezereum seeds, which is stated to act as an irritant and vesicant" (*Prof. Warden*).

130

Daphne oleoides, *Schreb.; Fl. Br. Ind., V., 193; Royle, Ill., t. 81.*

Syn.—DAPHNE MUCRONATA, *Royle;* D. CORIACEA, *Royle;* D. BUXIFOLIA, *Vahl.;* D. ACUMINATA, *Boiss.;?* D. CASHEMIREANA, *Meissn.*

Vern.—*Kútilál, kanthan, gandalún, shalangri, zosho, shing, mashúr, swána, jikri, dona, channi niggi, kágsari, sind, kánsian, sondi, ahi, lak*, PB.; *Laghúne*, AFG.; *Pech*, SIND.

The above vernacular names are given by most authors under the old synonym of D. mucronata.

References.—*Brandis, For. Fl., 385; Gamble, Man. Timb., 315; Stewart, Pb. Pl., 189; Aitchison, Cat. Pb. and Sind Pl., 130; Aitchison, Kuram Valley Flora (Jour. Linn. Soc., XVIII.), 25; Baden Powell, Pb. Pr., 577; Atkinson, Him. Dist., 574; Royle, Ill. Him. Bot., 321.*

Habitat.—A small much branched shrub, met with on the Western Himálaya, from Garhwál westward to Murree, the Suliman Range, and Afghánistán, occuring at altitudes of from 3,000 to 9,000 feet.

Regarding the season of flowering of this species there seems to be some confusion. Brandis says that it occurs in September and October; and the fruits, which are orange or scarlet, mature in May and June. As if to contrast this statement with an error made by Stewart he gives the following paranthetic quotation ("blossoms May-July, at times October, the fruit usually ripening June-October"—*Stewart*). Gamble refers to the plant as met with in the Simla District: if it does so, it must be extremely rare. The writer has not as yet come across it in Simla, but with reference to the season of flowering he has samples of the plant from Quetta in full flower and dated May, and from Pangi, dated June.

MEDICINE. Roots. 131

Medicine.—Aitchison, in his *Flora of Kuram Valley*, says that the ROOTS of this plant are used internally, when boiled, as a medicine, being purgative. In another place he says: "Camels will not eat this shrub except when very hungry. It is poisonous, producing violent diarrhœa. I feel certain that much of the mortality of camels in the Kuram division was due to the prevalence of this shrub."

Bark. 132 Leaves. 133 Berries. 134

The BARK and LEAVES are used in native medicine. The BERRIES are eaten to induce nausea. Stewart refers to this plant as hurtful to camels, thus making the same observation as recorded by Aitchison. Stewart further says the bark is used by women in Kanáwar for washing their hair, and adds that it has been tried for paper-making.

It seems highly probable that the Mezereon which Irvine and other writers mention as imported into India from Afghánistán and Persia is this plant and not the true D. Mezereum.

SPIRIT. BERRIES. 135

Spirit.—Brandis says that on the Sutlej a spirit is distilled from the BERRIES..

136

D. pendula, *Sm.; Fl. Br. Ind., V., 194.*

Syn.—DAPHNE MONTANA, *Meissn.;* ERISOLENA MONTANA, *Blume.*

Reference.—*Kurz, For. Fl. Burm., II., 333.*

Habitat.—A smaller plant in all its parts, otherwise doubtfully distinct from D. involucrata; met with on the hills between Nattoung and Moulmein, Burma. Kurz says it occurs on the damp hill forests of the Martaban east of Tounghoo at 5,000 to 6,000 feet elevation, and flowers in April.

FIBRE. 137

Fibre.—It seems probable that this plant affords the Nepál paper said to be made in Burma and the Straits.

Daphnidium, *Nees; Gen Pl, III., 163.* Reduced to Lindera, *Thunb., Fl. Br. Ind., V., 182.*

Daphniphyllopsis capitata, *Kurz;* see Nyssa sessiliflora, *Hook. f., Fl. Br. Ind., II., 747;* CORNACEÆ.

DAPHNIPHYLLUM, *Bl.; Gen. Pl, III., 282.*

[EUPHORBIACEÆ.

Daphniphyllum glaucescens, *Blume.; Fl. Br. Ind., V., 353;* [*1878-9.*

138

Syn.—D. ROXBURGHII, *Baill.;* GOUGHIA NEILGHERRENSIS, *Wight, Ic., t*

Vern.—*Nir-chappay* (by the Badagas), NILGIRI HILLS.

References.—*Beddome, Fl. Sylv., t. 288; Gamble, Man. Timb., 384; Man. Madras Adm. Report, II., 110; Balfour, Cycl. Ind., I., 889; Thwaites, Enum. Ceylon Pl., 290.*

Habitat.—A small tree ... uth ... of

Timber.

139

D. himalayense, *Muell.; Fl. Br. Ind., V., 354.*

140

Habitat.—A small tree, very much like the preceding, but found on ... sam, and Burma, at altitudes

DOMESTIC.

141

... *379,* it is said to be known as ... frequently used in marking the ... *andan* of most writers is Ptero- ... la, the wood of either of which is in the plains used for marking the forehead.

Dárchíní or **Dálchíní,** see Cinnamomum Tamala, *Fr.*, Vol. II, C. 1183

Darengri.—Balfour mentions this as a name given in Kashmír to a leaf used in dyeing. The writer is unable to discover what plant is meant.

142

Darí, see Carpets, Vol. II., C. 627.

Darmá, see Mats and Matting.

143

... ployed in Eastern Bengal for the construction of the walls of houses." The writer's experience of Bengal goes towards the conviction tha- ...

... who examined these were of opinion a trade might be done in the former but not in the latter. The contention as to wha is or is not *darma* is therefore of little importance as compared with the distinction urged above of sending Phragmites mats to Europe in preference to bamboo in any efforts towards opening up trade in these articles. This explanation has been thought necessary, since in his chapter on Mats, Mr. Mukharji make-

no mention of the reed mats here specially indicated. The plant fr which they are made is abundant on all the islands and sandy river ba in Bengal, and the trade in making and selling these mats is very extensi
See Phragmites Roxburghii.

Dates and **Date Palm**, see Phœnix dactylifera, *Linn.*

DATISCA, *Linn.; Gen. Pl., I., 844.*

144

Datisca cannabina, *Linn.; Fl. Br. Ind., II., 656;* DATISCACEÆ.

Syn.—D. NEPALENSIS, *Don.*

Vern.—*Akalbir or kalbir, bhang-jala,* HIND.; *Akalber, bajr or bha jala,* N.-W. P.; *Waftangel,* KASHMIR; *Akilbir, eqilbir, bhang ja drinkhari, sida atsú,* PB.; *Akalbar,* HIND. IN BOMB. (*Dymock*).

References.—*Gamble, Man. Timb., 207; Stewart, Pb. Pl., 191; D Prodr. Nep., 203; Dymock, Mat. Med. W. Ind., 2nd Ed., 355; Murr Pl. and Drugs, Sind, 43; Baden Powell, Pb. Pr., 372; Atkinson, H Dist., 724, 774; Liotard, Dyes, 90, 96; Wardle, Report on the Dyes India, p. 24; Linnæan, Soc. Jour. XIX., 4; Balfour, Cyclop., I., 8 1005; Robinson, Gleanings from French Gardens, p. 42.*

Habitat.—A tall, erect herb, resembling hemp, hence the specific nan It is met with in the temperate and sub-tropical Western Himálaya fr Kashmír to Nepál, at altitudes from 1,000 to 6,000 feet, but is by means a plentiful plant. Dr. Dymock says: "The plant is a native Sind." This seems highly doubtful.

DYE. 145

Dye.—Many writers allude to this as a special dye used in Kashmír dye silk a delicate yellow colour. Throughout the Himálaya it is mo or less employed, being combined, it is said, with red colours to soften t tint, and with indigo to produce a favourite green (*pista*). Stewart write "In some of the places where it grows, the yellow root is used to aid dyeing red, and Cleghorn states that it is exported from Pangi, Laho and Kúllú, to Nadoun and Amritsar to be used in dyeing woollen threa Edgeworth mentions that for this purpose it is combined with *asbarg* (Delphinium saniculæfolium [or rather D. Zalil,—*Ed.*]). In a recent repo furnished by the Conservator of Forests, North-West Provinces, it is state that the dye-stuff is exported from the Himálayas to the plains to be us both as a dye and medicine.

The parts employed are the yellowish wood, bark, and root.

SPECIAL OPINIONS.—§ "Used extensively as a dye, for which purpose is exported from Kashmír" (*Surgeon-Major J. E. T. Aitchison*). "Datis cannabina (*akilbír*) is found sparsely scattered throughout the forest upper Kunawur, and more plentifully to the west of Wangtú, particular in the Saldung Valley. It is known as producing a yellow dye, and t roots sell at Amritsar for R14 per maund of 80lb. In August the roo are dug up (the bark peeled off), dried in the sun, and then packed for expo to Rampur or Amritsar. About 200 to 300 maunds are obtained annuall in Bashahr on the Sutlej. It is not known if any be sent from the Rupin Paber Valleys. One root yields from ½ to 1 seer. The seed or flowers a of no use as far as is known" (*G. G. Minniken, Esq., Assistant Conservato of Forests, Bashahr*).

MEDICINE. 146

Medicine.—Medicinally, it acts as a sedative in rheumatism. As bitter and purgative, it is used sometimes in fevers and in gastric an scrofulous complaints. In intermittent fevers, it is administered in doses o from 5 to 15 grains (*Dymock, Mat. Med. West. Ind., 1st Ed*). In the secon edition of his work Dr. Dymock seems to have modified slightly hi statements regarding the drug, but adds that in "Khagan the bruise

ROOT is applied to the head as a sedative" Balfour says it is used as an expectorant in cattarrh "The BARK also contains a bitter principle like quassia"

MEDICINE. Root. 147 Bark 148

Chemistry —The peculiar property of the dye principle of this plant does not seem to have been worked out, and results of some interest may be expected from its thorough examination Dr Warden (Professor of Chemistry, Calcutta), in reply to an enquiry on this subject, furnished the following brief note —

CHEMISTRY. 149

"It contains a glucoside, datiscin, which crystallises in colourless needles or laminæ It forms with alkalis a deep yellow solution, and, accord-

in alcohol, and the remaining traces of resin removed by re precipitation with water Datiscin may then be obtained in colourless silky needles or scales, little soluble in cold water, and only sparingly so in warm water and ether The crystals are neutral and have a bitter taste, they melt at 180° C." (*Wurtz, Dict de Chem, t I, 1134*)

DATURA, *Linn; Gen. Pl., II., 901.*

150

By some writers Datura Stramonium is supposed to be the στρύχνος μανικος of Theophrastus and Dioscorides This, however, seems open to doubt, as the descriptions of the plant alluded to by these classical authors do not justify such an opinion It is, indeed, doubtful if even Stramonium was known dur

τατουλα, a

Muhamma

the name

the Persiar

given to it in Southern India *Ummettak-kay* comes from the Sanskrit synonym *Unmatta*

The Arabic and Sanskrit literatures fully establish an ancient knowledge of the properties of the drug But so much difference of opinion prevails amongst modern writers on the medicinal as well as non-medi-

certainly not specific Writers who speak of the purple flowered being a more powerful poison than the white, may have originally got their ideas from an ascertained fact, namely, that a form, *one* of the characters of which was to have flowers of that colour, had the poisonous property highly developed But any of the Indian species or varieties may have purplish

DATURA. | **Colour of the Flowers of Datura.**

HISTORY.

flowers. Indeed, D. alba, a name formerly given to what is now treated as a variety of D. fastuosa, has often purplish flowers. So, again, D. Metel has generally white flowers, but sometimes they are purplish. Either of these species may, however, have been the white-flowered datura of the early writers; and very probably it was D. Metel that was their less poisonous white-flowered datura and not D. alba as supposed by most modern authors. It thus follows that nothing could be more misleading than to base an opinion as to the merits of a datura simply because of its flowers being purple or white. Few plants could generically be more easily recognised than the *dhaturas.* The long-plaited corolla and inflated calyx, the latter separating transversely on fertilisation so as to leave a collar around the base of the thorny fruit, are unmistakeable characters. And these characters are peculiar to all the forms, but cultivation may modify the colour of the flower or even double the flower—one corolla appearing to grow from the interior of the other. How far the chemical properties of the plants are affected by selection or care in cultivation it is impossible to discover. But one thing is certain, that the daturas have been and are to some extent cultivated, and many of the peculiar forms met with in certain localities are most probably escapes from a former cultivation. Indeed, it is scarcely possible to avoid the conviction that cultivation has had far more to say to the peculiarities of the daturas than is generally believed. In a great many Indian localities the plant appears at most only semi-wild, and has all the appearances of being the degenerated offspring of a cultivated stock, once upon a time much more generally cared for than at the present day. There are, for example, numerous forms known to the native expert that would be utterly unrecognisable in the herbarium. Like the forms of Aconitum Napellus some of these are poisonous and others comparatively innocuous. The shepherd will dig up and eat one form of Aconite but eschew another, recognising it as a virulent poison. But to the botanist they are indistinguishable. This same knowledge is prevalent regarding the forms of datura. That we should longer remain entirely ignorant of these facts is doubly to be regretted, since we are alike unable to check criminal abuse and to take full advantage medically of the meritorious forms.

As sold in the Indian bazars, datura should be used with the greatest caution. It would richly repay any person having the opportunity and leisure to prosecute such researches, to cultivate in India side by side all the forms known to the natives, and having critically examined and described these, to have them subjected to chemical analysis. It might then be possible to establish some more trustworthy standard by which to differentiate the daturas than we possess at present. Such a study might not reveal a more extensive series of varieties and cultivated forms than is supposed to exist; but that the specific distinctions recognised by botanists would thereby be broken down seems highly likely. Possibly all the Indian daturas constitute but one or at most two species. The differences currently admitted are scarcely more than what in most other genera would be attributed to climatic causes. Datura Stramonium might be called the type of the temperate or alpine series, and D. fastuosa that of the tropical or plains assemblage. Some of the conditions of the former, like some of those of the latter, have blueish flowers; certain are recognised as virulent poisons, others sufficiently less so to be employed neither criminally nor medicinally. M. Naudin devoted much careful study to the species of Datura, cultivating all those of which he could procure the seeds. It is recorded that Dr. George Bidie, C.I.E., of Madras, sent seeds of D. alba to Professor Flückiger, and that these were handed over to Naudin. As the result, plants, *first,* of the true D. alba, were obtained; *second,* plants with flowers white inside and violet outside; *third,* plants with double corollas of a large

D. 150

HISTORY.

size and yellow colour It is remarkable that these should all be said to

a confession of defective knowledge, and an appeal for more critical study The reader is referred to the remarks below (under each species) for a brief description of the forms commonly recognised But before passing from this introductory account it may be as well to allude to one or two authors whose writings deserve consideration, although it is impossible to *decide to what particular species or form they more especially allude* Garcia de Orta visited India in 1534 and became physician to the hospi-

hearbe called Deutroa which beareth a seed, whereof brusing out the sap they put it into a cup or other vessel and give it to their husbands, eyther in meate or drinke and pre

hee were halfe out of his wits, and w

nothing but) laugh, and sometime

lieth) like a dead *man, so that in*

will and take their pleasure with their friends, and the husband never know of it In which sort he continueth foure and twentie hours long, but if they wash his feete with colde water hee presently reviveth and knoweth nothing thereof but thinketh he had slept" Commenting on Linschoten s account of the drug his contemporary Paludanus states that "*Deutroa* of some called *Tacula*" (a misprint for *tatula*), "of others *Datura*, in Spanish *Burla Dora*, in Dutch *Igell Kolban*, in Malaba *Vumata Caya*, in Canara *Datura* in Arabic, *Marana*" (the Arabian name is *Jauz masal*) "in Persian and Turkie *Datula* Of the description of his hearbe and fruit you

or eatheth but half a dr

his wits and taken with

quently recurs to datura

in abundance, and althou

never-the-less those that

dayly eat thereof, &c."

enlarges at great length on the various criminal uses of the drug, he makes no mention of the medicinal

The *Makhzan* recommends preference to be given to the purple flowered datur

parts of the plant are

the following account of

looks at appears dark, he fancies that he really sees all the absurd impressions of

DATURA fastuosa.

The Black Datura.

HISTORY.

variety is specified, as, for example, in a prescription for insanity, quoted below. *Dhaturá* leaves are used in smoking by debauched devotees and others accustomed to the use of *gánjá*. The seeds are added to the preparations of *bháng* (leaves of Cannabis sativa) used by natives for increasing their intoxicating powers. *The use of the powdered seeds in sweetmeats*, curry powder, &c., for the purpose of stupifying travellers and then robbing them is well known." Further on, Dutt says of the habit of smoking the leaves as a cure for spasmodic asthma: "I have not met with any written prescription for it in Sanskrit or vernacular medical works, nor does the *Taleef Shereef* allude to the practice as known to the Mussulman Hakims. It would seem, therefore, that this use of the drug is of recent origin." Smokers of *gánjá*, however, as is well known, suffer from violent fits of a kind of false asthma, so that the habit of smoking the leaves by devotees, &c., to which Dutt alludes is practically a recognition of the property the knowledge of which he excludes the early Sanskrit authors from possessing. In the passage quoted above it may be doubted whether Dutt is narrating his own knowledge of the modern employment of the leaves or is quoting the opinions of Sanskrit writers. The point is of considerable historic interest. Ainslie found that the natives of South India, during his time (1820), were unacquainted with the value of the leaves in the cure of asthma, and it is commonly stated by writers on the subject that the discovery of this property is due to European medical science.

151

Datura fastuosa, *Linn.*; *Fl. Br. Ind., IV., 242*; SOLANACEÆ.

THE BLACK DATURA.

Syn.—DATURA HUMMATU, *Bernh.*; *Dalz. and Gibs., Bomb. Fl., 174.*

Vern.—*Kala dhatúrá*, HIND.; *Kala dhuturá*, BENG.; *Dhatura*, SANTAL; *Khunuk* (according to Irvine), BEHAR; *Toradana* (Peshawar District), PUSHTU; *Dhaturo* (there are two kinds—*acho*, white, and *káro*, black, Stocks), SIND; *Kala dhatúrá*, BOMB.; *Kálá-dhatúrá*, *údah-dhatúrá*, DEC.; *Kala dhatúrá*, or *kálo-dhatúro*, GUJ.; *Karu-vúmattaí* (Moodeen Sheriff), *Karu-umate*, *karú umatay* (Ainslie), TAM.; *Nalla-ummetta* (Elliot), TEL.; *Karu-ummatta* (Moodeen Sheriff), *rotecubung*, *kechubung* (Ainslie), MALAY; *Pa-daing-ame*, *padáyinkhatte*, BURM.; *Attana* (Trimen), *Kalu attana* and *antenna* (Ainslie), SING.; *Dhattúra*, *dhustura*, *unmatta*, *kála-hémiká* (Moodeen Sheriff), *krishna dhattúra* (Ainslie), SANS. *Jouz-massel* (Avicenna states is more correctly D. Metel, but that name is now given to this species); *Jouz-másle asvad*, *jouz-másame-asvad*, ARAB.; *Kechu-búh* (according to Ainslie), ARAB. in Egypt; *Tátúrahe-siyáh* (*Nabrak* according to Stocks), *guzgiah* (Ainslie), *kaiz-másale-siyáh*, *kouz kunde-siyah*, and *Tátúrahe-siyáh* (Moodeen Sheriff), PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 188; Dalz. & Gibs., Bomb. Fl., 174; Flora Andhrica, 128; Mason's Burma, 488, 798; Report on the Botany of Merwara by J. F. Duthie; Voyage of John Huygen van Linschoten to the East Indies, I., 210-211 and II., 68; Garcia de Orta, Coloquios, pp. 83-84; Ainslie, Mat. Ind., I., 442, 636; O'Shaughnessy, Beng. Dispens., 59; Moodeen Sheriff, Supp. Pharm. Ind., 130; U. C. Dutt, Mat. Med. Hind., 207; Dymock, Mat. Med. W. Ind., 2nd Ed., 518; Flück. & Hanb., Pharmacog., 462; U. S. Dispens., 15th Ed., 1364; Bent. & Trim., Med. Pl., 192; S. Arjun, Bomb. Drugs, 97; Murray, Pl. and Drugs, Sind, 155; Waring, Bazar Med., 52; Irvine, Mat. Med., Patna, 27; Hummatu in Rheede's Hort. Mal.; Baden Powell, Pb. Pr., 297, 363; Atkinson, Him. Dist., 735; Drury, U. Pl., 188; Birdwood, Bomb. Pr., 209; Balfour, Cyclop., I., 897; Smith, Dic., 152; Med. Top. Ajmir, 133; Mysore and Coorg Gaz., I., 56, 63; Gazetteers (Kanara), XV., 439; (Gujrat) 11; Peshawar 26; Orissa II., 180; Special Report from the Government of Burma where it is*

The Black Datura (G Watt)

DATURA fastuosa.

said to occur in Chindwin Valley, Kyaukpyu Mandalay Upper Burma, Toungoo, Ruby Mines, and Bhamo districts, Special Report from Bengal, where the plant is said to be often grown in gardens

Habitat —A small shrub found all over the tropical parts of India, in waste places There are said to be t
this plant, the type being ascertained
white or purplish, large, corolla oft
mouth which is sometimes 5 inches
flower frequently seen to be double
roundish (not ovate) spinose all over, stalk recurving with maturity until the fruit becomes pendent When the seeds are ripe the fruit opens irregularly, forming a few short valves

This is very generally reputed to be the most virulent form of the

Makhzan gives preference to the purple-flowered datura (presumably D fastuosa), but according to Dutt the Sanskrit writers do not make any distinction in the properties of the two plants, though the white form (D alba) is recommended to be used for insanity Dalzell and Gibson say there are several well known varieties of D alba They, however, make no mention of these being used medicinally Of D Hummatu (= D fastuosa) they remark that in Bombay it is almost as common as the preceding They then add "These plants are intoxicating and narcotic the root is used in violent headaches and epilepsy, poultices are made of the leaves for repelling cutaneous humours, the bruised seeds are ap-

of these and of D Stramonium, that we are enabled to infer that they contain the alkaloid *Daturine*

But it may be added that D fastuosa is so universally believed to be stronger than D alba or D Metel, that it is preferentially used by the criminal classes

CRIMINAL PURPOSES

Criminal Purposes —Considered by some of the native doctors a better variety than the white, the *Pharmacopœia of India* affirms that there is no foundation for this opinion The SEEDS constitute a favourite

Seeds 152

the liquor is thrown into them and the mouth covered over for a night It seems remarkable that when thus burned the smoke should retain its poisonous and intoxicating properties Dr Dymock states that in

DATURA fastuosa.

The Black Datura.

CRIMINAL PURPOSES.

Bombay the smoke from the seeds burned over charcoal is also used to make liquor intoxicating. Mr. H. Sewell, Collector of Cuddapah, reports: "This is known as *Umatai* in Tamil. There are two species—white and black. Both grow wild and are not cultivated. The former is not used for any purpose. For mixing with intoxicating beverages, for instance toddy, the latter is useful. Its seeds are soaked in that liquor along with a quantity of poppy seeds ground to a paste. The mixture is then strained and mixed with fresh-drawn toddy, which gives the latter intoxicating power. It is not possible to estimate the quantity of datura seed consumed in this way." Mr. Baden Powell (*Pb. Prod., I.*, 207) alludes to a series of samples shown in the Lahore Museum as illustrative of the criminal methods of using the drug in Upper India. He says (quoting from a report on these written in 1863): "The series consists of the seeds of the plant in their raw state, seeds roasted, essence of the seeds, atta (flour) drugged with the poison, sugar ditto, and tobacco ditto." He then remarks this is the agent used by the "Thugs" to stupify their victims. "Both kinds of the dhatura, the white and the purple, are used, but the white (*sic*) is considered the most efficient." "For poisoning purposes the seeds are parched and reduced to a fine powder: thus it is easily mixed with sugar, atta, tobacco, &c. Also the professionals distil the seeds with water, forming a powerful essence; ten drops of this is sufficient if put into a *chillam* of the *huka* to render a man insensible for two days. The taste is acrid and bitter, and soon followed by a burning suffocating sensation. It is very difficult to detect in a *post mortem* examination. The victims are usually discovered in a state of insensibility, and breathing hard and heavily; if removed, care should be taken not to expose them to the heat of the sun, which is fatal. The action of the poison is quicker in the hot weather than in the cold; much, of course, depends on the individual constitution of the victim, but usually in hot weather it begins to work in five minutes, coma supervening within the hour. In cold weather it begins to act in a quarter of an hour or twenty minutes."

MEDICINE. 153

Medicine.—For Medical uses proper, see under *var.* alba.

SPECIAL MEDICAL OPINIONS RECORDED UNDER D. fastuosa.§—"The form of datura with blue flowers is considered stronger than the white kind. No doubt this drug prevents hydrophobia. There are persons here and there in this district who are considered professors in curing hydrophobia. But none of them will reveal the secret of the medicine used. With great pains and labour I discovered this remedy. I have myself treated many cases successfully, and some of my pupils have been equally successful. My treatment consists in giving the medicine previous to the time of the development of hydrophobia."

"It is usually found that hydrophobia comes forty days after the patient has been bitten by the mad dog (except some rare cases which I have known to happen within two or three weeks). My treatment is to give the following medicine two weeks after the patient has been bitten, *i.e.*, between the fifteenth and twenty-fifth days. In the morning after the fifteenth day of the bite, about six o'clock, give a dessert spoonful of tea wood-charcoal powder. (This seems to be given lest the poison of the juice overcomes the patient.) Half an hour after give an ounce of the JUICE of the black datura leaves. Soon after follow with Palmyra jaggery or something else in order to check vomiting. Then, bind the person lest he does mischief to others, and keep him in the sun for four or five hours, until midday. Then, the person gradually becomes mad, and does many things like the mad dog (when these symptoms appear, it is evident that the patient had been really bitten by a mad dog, and that he will totally recover). In the afternoon pour many pots of cold water over the head. This causes

MEDICINE.

Leaves. 154

datura is recommended in the cure of supposed mad dog bites The English of the original has been slightly altered and superfluous matter removed, but the principle and method of treatment has been faithfully preserved [*Ed, Dictionary, Economic Products.*]

"I have used this drug pretty extensively In painful swellings I apply the JUICE of fresh leaves, or make a poultice of them The fresh juice in ophthalmic pain I find very useful, it checks the inflammation if there be any Inhalation of the smoke of the burning DRY LEAVES and TWIGS is always useful in asthmatic fits Smoking the powdered dry leaves and twigs relieves the spasm, but when smoked in excess brings on giddiness and fainting The seeds are said to be useful in cases of hydrophobia, and the anther in cholera" (*Civil Surgeon D Basu Faridpur, Bengal*) "The dried ROOT of the plant I have frequently used, as smoking, to relieve fits of asthma" (*Nundo Lall Ghose, Bankipur*) "In ear-ache the fresh juice of the leaves is useful, a drop or two poured inside the ear" (*Assistant Surgeon T N Ghose, Meerut*) "The dried

Juice 155

Dry Leaves. 156

Twigs 157

Root 158

were sent

poisoning,

I) "The

Seeds 159

efficacious when applied over painful glandular swellings" (*Assistant Surgeon Shib Chandra*

root of the above, in

the N.-W. Provinces

The seeds are also employed by them for impotence in the following way seeds of 15 fruits dried and pounded are well boiled in ten seers of cow's milk, out of this milk as much ghee as possible is made, this ghee is believed to contain strong aphrodisiac properties, and is rubbed on the genitals twice a day, to stimulate them, and about four grains of the ghee is also given internally once a day (*Assistant Surgeon Nobin Chunder Dutt, Dhurbhanga*) "In Mysore the juice of the leaves is given once daily with curdled milk for gonorrhœa" (*Surgeon Major John North, I M S, Bangalore*). "Have used the leaves warmed over a fire nightly as an external anæsthetic in rheumatism" (*Dr Picachy, Civil Medical Officer, Purneah*) "The leaves are useful as a local application in rheumatism The concentrated juice of the leaves is prescribed in mumps as a

The White Datura.

MEDICINE.

local application, and has a marked effect in reducing the swelling and tenderness" (*Narain Misser, Kathe Bazar Dispensary, Hoshangabad, Central Provinces*). "An extract made from the seeds is a good mydriatic, and the leaves are used as emollient and suppurative" (*Honorary Surgeon Easton Alfred Morris, in Medical charge, Tranquebar*). "The leaves of this plant are boiled, made into a poultice, and applied locally to boils and abscesses to relieve pain and hasten suppuration" (*Surgeon W. F. Thomas, Mangalore*). "A few seeds with *úqarqarha* (Anacylus Pyrethrum) root and cloves are chewed as an aphrodisiac" (*Dr. Emerson*). "A paste composed of datura and turmeric is useful in checking inflammation of the breasts" (*Civil Surgeon J. Anderson, M.B., Bijnor*). "The juice of the leaves is a good substitute for Belladonna" (*Surgeon Major P. N. Mookerjee, Cuttack, Orissa*).

160

Var. alba, *Nees; Fl. Br. Ind., IV., 243.*

WHITE DATURA.

Syn.—D. ALBA, *Nees.*

Vern.—*Saféd-dhatúrá, sádah-dhatúrá,* HIND.; *Dhútúrá,* BENG.; *Dather,* KASHMIR; *Dhotará,* MAR.; *Ujlá-dhatúrah,* DEC.; *Dhoto dhatúro,* GUJ.; *Umattai,* TAM.; *Ummetta, duttúramu,* TEL.; *Ummatte-gidá,* KAN.; *Ummatta, ummam,* MALAY; *Padáyin-phiu,* BURM.; *Sudu-attana,* SING.; *Ummatta-vrikshaha,* SANS.; *Jouz-másal* or *Jouz-másle-abyaz,* ARAB.; *Kouz-másale-saféd, tátúrahe-saféd,* PERS.

NOTE.—It is doubtful how far the vernacular names given by authors for **D. fastuosa** and **D. alba** can be regarded as specific, since either forms may have white or blue flowers. Indeed, these plants have more generic than specific names, the simple equivalents of *Datura* of the plains as the names given by the hill tribes are but further synonyms, though given to the form met with in the higher regions, *viz.*, **D. Stramonium.**

References.—*Flora Andhrica, 48, 186; Mason's Burma, 488, 798; Pharm. Ind., 175, 460; Ainslie, Mat. Ind., I., 442; O'Shaughnessy, Beng. Dispens., 469; Moodeen Sheriff, Supp. Pharm. Ind., 130; U. C. Dutt, Mat. Med. Hind., 207; Dymock, Mat. Med. W. Ind., 2nd Ed., 518; S. Arjun, Bomb. Drugs, 96; Murray, Pl. and Drugs, Sind, 155; Year Book Pharm., 1880, 250; Baden Powell, Pb. Pr., 363; Atkinson, Him. Dist., 735; Drury, U. Pl., 188; Lisboa, U. Pl. Bomb., 268; Bomb. Gaz., V., 27; Balfour, Cyclop., I., 897; Home Dept. Cor. regarding Pharm. Ind., 222, 230, 321; Madras Man. Admin., II., 65; Man. Cuddapah, 200; Orissa Gaz., II., 180; Gaz., Mysore and Coorg, I., 56; Gaz., N.-W. P. (Meerut), II., 506, III., 81.*

Habitat.—A large, spreading annual, two to four feet high, found like the type form of the species throughout the warmer parts of India, though it only rarely ascends above 3,000 feet. This form doubtfully deserves the rank of a variety. The characters of the flower and fruit are almost identical with that already given, except that they are smaller, the teeth of the calyx being less than half the size of those in **D. fastuosa,** and almost lanceolate-acuminate instead of ovate-acuminate. Flowers white or slightly bluish outside.

If anything this is even more abundant, and fortunately so, for it is very generally reputed to be less virulent than the black dhatura.

MEDICINE. Seeds. 161 Leaves. 162

Medicine.—The properties of the Indian plains *Datura* are supposed to be practically identical with those of **D. Stramonium** and analogous to those of Belladonna. The officinal parts are the SEEDS and the LEAVES: of the former a tincture, an extract, and a plaster are prepared, and of the latter a poultice, but the dried leaves are also smoked to relieve urgent symptoms in spasmodic asthma, the dyspnœa of phthisis, emphysema of the lungs, or even in chronic catarrh. The tincture and extract are sedative and narcotic; the former preparation by many writers is recommended as a useful and cheap substitute for opium, 20 drops of the

The White Datura (G Watt) DATURA fastuosa.

MEDICINE

tincture being equal to a grain of opium The latter has been frequently employed as a convenient substitute for extract of Belladonna the dose being a quarter of a grain, increased gradually to a grain and a half, thrice daily Dr Bidie suggests an extract from the leaves, a ...
c
a
I
the larger dose in which it can be admin stered is an advantage The plaster and the poultice are effectual local anodynes in case of nodes rheumatic enlargements of the joints, painful tumours or external piles The plaster is frequently used on the chest in asthma and chronic pul monary affections, but neither should be applied to ulcerated surfaces owing to the risk of absorption of the poison Amongst native women a poultice of *datura* leaves is a favourite method of arresting the secretion of milk in cases of painful breasts The active principle *daturine* in place of atropia has been proposed for ophthalmic purposes, but with comparatively little success The effect of the administration of *datura* is to produce dilatation of the pupil "should it become very large and dilated this may be taken as a sign that the medicine has been carried as far as it can with safety, whether it has produced its other intended effects or not" (*Waring, Baz Med*, *53*)

Waring recommends it to be tried in tetanus (lock-jaw consequent on a wound) when other better remedies are not procurable "A poultice of the leaves, renewed three or four times a day, should be kept constantly to the wound, which should be further cleansed if covered with thick discharge or slough by the process of irrigation of tepid water The tincture of datura, doses of 20 to 30 drops in water, may also be given internally three or four times a day The dose must be regulated by the effect produced, but it
yield), till it produces
diness, drowsiness, or
carry the medicine I
tant intervals, and are less severe and prolonged when they do occur, the medicine in smaller doses, at longer intervals, may be continued till the spasms cease altogether, but if, under the use of the remedy, after it has
P
a
a

The above may be viewed as a brief abstract of the current European medical uses of datura, but by the natives of India the drug is highly spoken of in the treatment of insanity, and of the painful headaches which often precede epilepsy and mania, and Ainslie mentions that Muhammadan doctors especially prescribe for these purposes a powder of the ROOT in very small doses not exceeding a quarter of a grain increased to three grains ...
...use of
...n the
...d for
...and
...and

Root. 163

DATURA fastuosa.

The White Datura.

MEDICINE.

spasmodic asthma, but most of all for the last complaint. Waring affirms that in some few cases it is not serviceable in asthma, but so frequently is it of great benefit that patients subject to chronic asthma should always keep a pipe filled and ready to light. Dymock remarks that "Sanskrit writers describe the plant as beneficial in mental derangements, fever with catarrhal and cerebral complications, diarrhœa, skin diseases depending upon the presence of animal parasites, painful tumours, inflammation of the breasts, &c. A pill made of the pounded seeds is placed in decayed teeth to relieve toothache, and the leaves are smoked along with tobacco in asthma. According to Dutt no mention of the latter use of the plant is to be found in old Hindu books. Muhammadan writers also are silent upon this point. Ainslie found upon enquiry that the physicians of Southern India were unacquainted with the value of datura in spasmodic asthma, but he tells us that his friend, Dr. Sherwood of Chittore, noticed the smoking of D. fastuosa as a remedy in that disease. In the Konkan the juice of D. alba is given with fresh curds in intermittent fever to the extent of one tolá during the intermission, and at least two hours before the fever is expected." Ainslie (p. 637) mentions a case in which great relief was obtained in sciatica from an extract administered in one-eighth of a grain to grain doses. Drury states that a preparation of the leaves in oil is used in the cure of itch and rheumatic pains by being rubbed on to the part affected. In Sind, it is said that a poultice of the bruised leaves and rice flour is believed to relieve the pain and hasten the expulsion of guinea-worm. "The leaves of the white variety are sometimes chewed with the same object" (*Murray*). "In Rájputana mothers smear their breasts with the juice of the leaves to poison their new-born female children" (*Drury*). Mr. H. Z. Darrah, Director of Land Records and Agriculture, Assam, has furnished the following information regarding the daturas of the Assam Valley: "The Assamese *dhutara* is probably the D. Stramonium."—[This is most unlikely, since we have no knowledge of that species existing so far to the east; it is more than probable that one or two forms of D. fastuosa, or possibly also D. Metel, constitute the *dhutárá* of Assam.—*Ed.*] "The white flower, the purple flowering, and also the yellowish-tinged variety, are met with growing wild in villages and waste places. A few plants are specially protected for medicinal use. It is known as a strong poison and to cause delirium. The dried leaves are rarely smoked, and then only as a remedy in illness, but the leaves are used as a paste and applied: the seeds are taken internally with other articles as a medicine, and sometimes the root is used. It is not used as an intoxicant. It is said, according to a popular idea, to be put as an ingredient into a medicine used to prevent hydrophobia after the bite of a mad dog, but is given carefully and in sufficient quantity only to produce delirium or madness, which is thought to take the place of the madness of the hydrophobia. It is said to be ineffectual when hydrophobia has begun." Mr. Sewell, Collector of Cuddapah, Madras, writes that two forms grow wild in his district—the white and the black; the former is not used for any purpose, but the latter is employed for making toddy intoxicating. "The leaf is smoked along with tobacco by asthmatic patients." Mr. H. Willock, Collector of Trichinopoly, while stating that one or two forms grow "in back-yards and gardens," adds "it is never smoked."

Special Medical Opinions communicated regarding D. alba.§—"The juice of the leaves I have frequently used to dilate the pupils with success" (*Nundo Lall Ghose, Bankipur*). "The leaves are employed as an external application in rheumatism, the joint being enveloped in the leaves of the castor oil plant afterwards" (*Lal Mahomed, Hospital Assistant, Main Dispensary, Hoshangabad, Central Provinces*). "I have

MEDICINE.

used a pulp of the leaves, made with water, as an application in sweating of the feet with success" (*Civil Surgeon L Cameron, M D, Nuddea*) "The juice of the leaves is used as an antiperiodic in intermittent fevers" (*Surgeon-Major D R. Thomson, M D, C I E, Surgeon, 1st District, Madras*).

164

Datura Metel, *Linn, Fl Br Ind., IV, 243*

The origin of the name Stramonium is obscure, but it appears to have been first given to this species—a plant which, as a matter of history, is known to have been cultivated at Venice under that name about the

D. fastuosa is the D. rubra of Rumphius" and is distinguished from D. Metel by having dark-coloured flowers, while those of D. Metel are white" He then proceeds to further distinguish these species by their

D. fastuosa, and a doubtful variety of that species, based on Rheede's ... On ... ede's ... (*DC, Prod XIII, Pt I, 542*), and the *Flora of British India*, to the variety D alba, described above It would thus seem that a considerable

fully belong

Vern —There are no specific vernacular names intended in India to denote this species All the names given above might be applied to it, but more especially those recorded under D alba Indeed, the writer strongly suspects that the "white dhuturá" of the early Sanskrit and Arabic writers was D Metel, as now known to botanists, and not the variety of D fastuosa known as alba

D. fastuosa and D. alba, whereas for centuries the purple datura has been held to be much more poisonous than the white

References —*Mason's Burma, 488, 798, Ainslie, Mat Ind, I 443, U C. Dutt, Mat. Med Hind, 297, Birdwood, Bomb Pr, 60, 209 Smith Dic, 152, Mysore, Cat Cal Exh, 21 Fleming, Med Pl and Drugs in As Res, Vol XI, 165*

Habitat.—A herbaceous plant, found in the Western Himálaya and mountains of the West Deccan Peninsula; probably introduced into India. **Fleming** (*As Res.*) in the passage quoted below affirms that this is a native of the Himálayas, and is the species met with in Kashmír. It is widely naturalised in the Old World and produces flowers and seeds the whole year.

This is a much more temperate species than the preceding, but in shape of flower and character of fruit can with difficulty be distinguished. The corolla possesses, however, 10 instead of 5 teeth or petals; the leaves are pubescent, and show a pronounced tendency to be cordate at the base. The stems are almost sub-villose, a character by which the plant may be recognised in the bazar product from all the other Indian daturas. It is a much smaller species than any of the others, its pubescence and 10-petalled corolla being its characteristic features.

MEDICINE. 165

Medicine.—**Sir George Birdwood** mentions this plant in his list of drugs of Bombay as if it were *the datura.* It possesses properties similar to those of the other species. **Fleming** (*As. Res., XI., 1840*), gives it the names of *D'hatura*, HIND., and *D'hustura*, SANS., and refers to *Murray, I., 670*, and *Woodville, II., 338*, works which the writer has not the opportunity of consulting. In a further passage (quoted in full under **D. Stramonium**) **Fleming** holds that this is a native of India, and seems to concur with **Linnæus** that it might be used in preference to **Stramonium.**

166

Datura Stramonium, *Linn.; Fl. Br. Ind., IV., 242.*

STRAMONIUM or THORN APPLE.

Syn.—DATURA FEROX, *Nees* (the plant described by **Madden** as the *Kála dhatúra* of Kumaon, *Atkinson, Him. Dist., p. 370*); D. WALLICHII, *Dunal*; STRAMONIUM VULGATUM, *Gærtn.*

Vern.—By many writers this bears the same popular names as have already been given under **D. fastuosa**, *var.* **alba**, and if the suggestion that **D. Metel** is the white *datura* proves incorrect, this is much more likely to be the plant meant than the **D. alba** of Botanists. *Sada dhútúrá*, BENG.; *Tattur, dattura*, PB.; *Kachola, datura*, AFG.; *Umatai*, TAM.; *Ummetta*, TEL.; *Datturi gida*, KAN.

References.—*Stewart, Pb. Pl., 156; O'Shaughnessy, Beng. Dispens., 59; Balfour, Cyclop., I., 897; Smith, Dic., 152; Kew Off. Guide to the Mus. of Ec. Bot., 100; Fleming, Med. Pl. and Drugs in As. Res., Vol. XI., 165.*

Habitat.—The temperate Himálaya from Baluchistan and Kashmír to Sikkim. It is distributed east and west along the outer Himálayas and thus covers a region of over 1,000 miles. Taking the neighbourhood of Simla as fairly representative of that area, it is very abundant around Simla, and is met with everywhere on the march north to Upper Kulu (a distance across the outer ranges of perhaps 150 miles); but everywhere it frequents road-sides and village sites, and but rarely is seen in the forests or on the wild uncultivated hills. In the deep valley of the Sutlej it is particularly plentiful, miles of country, as at Rampur, being literally covered with **Cassia Sophora, Cannabis sativa,** and **Datura.** It is often, however, difficult to say in these lower warm valleys, whether **D. fastuosa** or **D. Stramonium**, is the species present, since one plant may be found with the erect and the next with the nodding fruit. On the higher slopes no doubt need be entertained, as the plant there met with has the characteristic ovate, erect fruit bursting regularly into four valves for half of the entire length of the capsule. Although thus very abundant on the Himálayas, **Stramonium**, like the daturas

of the plains of India, exists in an isolated or disconnected manner from the surrounding vegetation, or forms compact formidable clumps, to the exclusion or extermination of all other plants, attitudes

author with a s,
or about cultivation up to a height of 7,000 feet. D. Stramonium is

Tatula (a form most writers
express the strongest
D. Stramonium) is a
peculiar attitude here
M. de Candolle's emphatic statement that it is not a native of the Himalayas, then must the further opinion be held that all the species of datura met with in India are introduced and acclimatised plants.

The botanical characters by which D. Stramonium may be recognised have been partly indicated above, but it may be as well to repeat these more fully. It is a more compact plant than D. fastuosa, more succulent and of a considerably paler green than the plant of the plains. The flowers are also much smaller, being only 1 to 3 inches in diameter, but
ly erect in the bifur-
It also bursts open

D. fastuosa (see page 33).

Towards the close of the sixteenth century D. Stramonium ...
vated in England by
In his *Herbal* he cal
is a drowsy and numl
(Atropa Mandragora), a plant, which gets its name from Atropos, the eldest of the all-powerful Parcæ, the arbiters of life and death"

MEDICINE.

Medicine.—It seems probable that on the Himálaya D. Stramonium is used for all the purposes indicated under D. fastuosa and D. alba. Stewart says: "The SEEDS are used in poisoning, and are given medicinally in asthmatic complaints, being sometimes smoked with tobacco thus, and for vicious indulgence. The LEAVES are applied to boils and ulcers, and are also smoked with tobacco for asthma." Mr. Baden Powell states that

Seeds 167
Leaves 168

so afflicted"

Fleming (*As. Res., XI, 1840, p. 166*) says: "The D. Stramonium, *Linn.*, which is the species used in medicine in *Europe*, is not found in

DATURA Stramonium.

Stramonium or Thorn Apple.

MEDICINE.

Hindústan,* but the D. Metel grows wild in every part of the country. The soporiferous and intoxicating qualities of the seeds are well known to the inhabitants, and it appears, from the records of the native Courts of Justice, that these seeds are still employed for the same licentious and wicked purposes as they were formerly in the time of Acosta and Rumphius (See *Rumph.*, *Amb. V.*, *242*). I do not know that either the seeds, or the extract prepared from the expressed JUICE of the plant, are used in medicine here; but those who place any faith in the accounts given by Baron Stœrck, and Mr. Odhelius (*vide* Murray and Woodville) of the efficacy of the extract of the Stramonium, in the cure of mania, epilepsy, and other convulsive disorders, may reasonably expect the same effects from the extract of Metel, the narcotic power in the two species being perfectly alike. Linnæus, indeed, has given a place, in his *Materia Medica* to the *Metel*, in preference to the Stramonium."

Juice. 169

SPECIAL OPINIONS REGARDING Datura Stramonium §.—"I have used the FRUIT as a poultice and anodyne in whitlow" (*Dr. Picachy, Civil Medical Officer, Purneah*). "A good anodyne application is made by preparing a warm infusion of the leaves, and this is effective in inflammatory pains; the crude juice of the leaves mixed with opium and rock salt makes a good local anodyne preparation when applied hot in rheumatism" (*Surgeon Edward S. Brander, M.B., F.R.C.S.E., I.M.D., Rungpore*). "The leaves, made into cigarettes, are smoked to relieve asthma. The smoke is inhaled into the lungs" (*E. G. Russell, Superintendent, Asylums, at Presidency General Hospital, Calcutta*).

Fruit. 170

For the European uses of the drug the reader is referred to works on Materia Medica.

CHEMISTRY. 171

Chemistry.—It has been stated that it is presumed that chemically the Indian forms of datura differ among themselves and from Stramonium more in degree than in quality. The active principle is the alkaloid *daturine*, a substance practically identical with *atropine*. The experiments of Schroff, however, would indicate that *atropine* has twice the poisonous energy of *daturine*, although the two alkaloids agree in composition, possess the same qualities in regard to solubility and fusing point, and have the same crystalline form. The identity of *daturine* with *atropine* has been maintained by several chemists, while the admission of the greater poisonous property of the latter is opposed to such an opinion. Ladenburg states that D. Stramonium contains two alkaloids, which he designates as heavy and light daturine. Pochl affirms that solutions of *daturine* are levogyrate, while those of atropine exhibit no rotatory power. It is probable that the light daturine if isolated would bear a much closer approximation to atropine than the mixture of the two.

The leaves contain the alkaloid in a much smaller proportion than the seeds, and even the latter possess only $\frac{1}{10}$th per cent. In the seeds it is said to be combined with malic acid. According to Joubert datura for opthalmic purposes is more powerful and lasting than atropia.

§ Dr. Warden (Professor of Chemistry, Calcutta) has kindly furnished the following note regarding the chemistry of datura:—"The alkaloids, atropia and datura, contained, respectively, in Atropa Belladonna, and Datura Stramonium, are either identical or agree very closely in chemical

* "In the *Asiatic Researches, VI., 351*, Colonel Hardwicke enumerates the Datura Stramonium among the plants which he found in the *Sirinagur* country; but he afterwards ascertained that the plant which he met with was the Datura Metel; and has candidly authorised me to notice the mistake" (*Foot-note by Dr. Fleming*).

CHEMISTRY.

composition Both widely dilate the pupil when applied locally to the eye or introduced into the system · 100 parts of the different portions of the plant in the dried state yielded to Gunther the following results ·—

Datura Stramonium		*Atropa Belladonna*	
Seed	318 to 365	Leaves	833
Stalks	063	Stalks	146
Leaves	169 to 307	Fruit, ripe	813
Root	·065	" unripe	955
		Seed	407
		Root	810

Gharbuli 172

Var. Tatula, *Willd , Fl Br. Ind , IV , 242 , flowers purple*

The young fruits, strung on threads and imported into India from Persia, seem to be those of this variety. It is said to be common everywhere ar [illegible]
fruits ar
(*Ainslie,* ·
intoxicat
identify

[illegible] DeCandolle
rican origin,
ng accident,

ations" (T
Ruth[illegible]
"So
mal
Supe

DAUCUS, *Linn , Gen Pl , I , 928*

173

Daucus Carota, *Linn , Fl. Br Ind , II , 718 ,* UMBELLIFERÆ

THE CARROT, *Eng* , CAROTTE, *Fr* , GEMEINE-MOHRE, GELBE RÜBE,*Germ* , CAROTA, *It* , LANAHORIA, *Sp* , MORKOV, *Rus.*

Vern —[illegible]

gazar PERS
[illegible] *Ain-i Akbari*
me *Sáli*, and
mock informs
Trachydium
· Botany of the

DAUCUS Carota.

The Carrot.

Afghán Delimitation Commission, calls that plant *Shahk-ukhal,* and says it is a very common annual in the loamy soil of the Badghis, the roots of which are collected and exported to India *viá* Herat. The *Shaqáqul* of the *Aín-i-Akbari* was a vegetable apparently regularly eaten in the time of the Emperor, and **Trachydium** is certainly not so in India at the present day.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 270; Dalz. & Gibs., Bomb Fl. Suppl., 41; Stewart, Pb. Pl., 105; Aitchison, Cat. Pb. and Sind Pl., 68; Flora Andhrica, 57; Stocks' account of Sind; Darwin, Animals & Plants under Domestication, I., 326, II., 31, 33, 113, 277, 311; Ainslie, Mat. Ind., I., 56; O'Shaughnessy, Beng. Dispens., 368; Moodeen Sheriff, Supp. Pharm. Ind., 131; U. C. Dutt, Mat. Med. Hind., 298; Dymock, Mat. Med. W. Ind., 380; U. S. Dispens., 15th Ed., 1598; Bent. & Trim., Med. Pl., II., 135; S. Arjun, Bomb. Drugs, 64; Murray, Pl. and Drugs, Sind, 200; Mueller, Sel., Ex-trop. Pl., 104; Johnston's Chem. Com. Life, 60, 86, 158; Johnston, How Crops Grow, 155-156; Anderson, Agri. Chemistry, 286; Baden Powell, Pb. Pr., 351; Atkinson, Him. Dist., 355, 703, 735; Lisboa, U. Pl. Bomb., 161; Birdwood, Bomb. Pr., 161; Royle, Ill. Him. Bot., 228-9, 231; Atkinson, Economic Products, Pt. V., 13, 18; Bomb. Gaz., V, 26; VII, 40; Folkard, Plant Lore, 270; Firminger, Man. Ind. Gard., 93, 100-101, 168; Spons, Encyclop., 1432; Balfour, Cyclop., 590, 898; Smith, Dic., 94; Treasury of Bot., 386; Morton, Cyclop. Agri., 407, 632; Kew Off. Guide to the Mus. of Ec. Bot., 77; Fleming, Med. Pl. and Drugs, in As. Res., Vol. XI., 166; Jour. Agri. Hort. Soc., 1875-78, Vol. V., 39, 1871-74, Vol. IV, 14; Report, Saharunpore Bot. Gardens, 1884, 6; Report, Lucknow Gardens, 1885, 5; Famine Com. Rept., App. to Parts I. and II., p. 87; Report by Sir E. C. Buck (then Director of Agri., N.-W. P.) dated 16th Oct. 1878; Annual Report, Sett., Port Blair, 1870-71, p. 43; Bomb. Gaz. (Kathiawar), Vol. VIII., p. 183; Special Report from Director, Land Records and Agri., Burma; Quarterly Journal of Agriculture (Vol. XI.) 1840-41, p. 268; Vol. III., 1847-49, p. 163; Vol. VI., 1853-55, p. 217; Vol. XI., 1863-65, p. 229; Adams, Wanderings of a Naturalist, 299; Aín-i-Akbari, by Abul Fazl (Transl. by Blochmann) pp. 63, 64, & 67.*

Habitat.—According to the *Flora of British India* the Carrot is a native of Kashmír and the Western Himálaya, at altitudes of from 5,000 to 9,000 feet. **Stewart** says its range in Kashmír is from 3,200 to 5,000 feet, and **Adams** alludes to the bear as feeding on the carrot and strawberry root. **Dr. Johnstone** has, in his herbarium of Simla plants, a specimen collected on Murale hill which has large fleshy roots. Of this he remarks that it is a favourite food with bears.

Throughout India the carrot is cultivated, by the Europeans, mostly from annually imported seed, and by the natives, from an acclimatised if not an indigenous stock. In many parts of the country a greenish white carrot is preferred as being very hardy and productive. This rises some two or three inches above the soil, is a coarse root which possesses little of the flavour of the European carrot, but it is able to withstand the extreme heat of summer, and may be raised in some parts of the country throughout the year. It thus produces a return at seasons when other tubers or roots are scarce or not available. This is particularly the case in Behar (Patna) and some parts of the North-West Provinces. **Sir Edward Buck**, while Director of Agriculture in these Provinces (1878), wrote a long and interesting note on carrot cultivation as a means of human food in periods of threatened scarcity or famine. The arguments then advanced have given to the subject of carrot cultivation in India an interest which, as an ordinary garden crop, it did not previously possess. The present account deals, therefore, more fully with the subject than most persons acquainted with Indian agriculture might be prepared to expect, and it is hoped, should necessity ever arise for strenuous efforts being made to produce food, that a compilation like the present, from all existing sources of Indian information, may prove useful.

The Carrot (G Watt) | DAUCUS Carota.

HISTORY. 174

prove that abundant nutriment produces a definite and inheritable effect on the so-called roots, with scarcely any change in other parts of the plant" Conversely, neglect or the consequences on a succulently developed plant running wild would naturally be to reduce the edible property until in time it might ultimately disappear. This retrogression is,

Kashmir he found that the people eat the wild carrot, a circumstance confirmed in a measure by the observation that bears eat it Indeed, it seems highly improbable from the simple examination of the wild carrot as met with in Europe, that the idea could ever have occurred of cultivating it, in the hope of producing an esculent root Aitchison found the carrot wild in the Kuram valley, but of the Hari rud (Afghanistan) he says the *zárdák* is not indigenous but a weed and an escape from cultivation, in cultivated land, also that the carrot is very extensively cultivated both in Afghanistán and in Persia According to most writers the δαυκον of Theophrastus was the carrot, and from that word the generic

Daucus Carota At the same time it is known that the Greeks actually cultivated the Carrot

extent

from a

or the rac

The Greeks often talked about κερατα ποιεῖν τινί and the individual so favoured was a χεραοθορός carrots and horns are, in fact, closely associated The Greeks called the plant Phileon, because of its supposed connec-

The Carrot.

HISTORY.

tion with amatory affairs. The word Daukon was given to an umbelliferous plant, but not necessarily the carrot, though generally accepted as such. Carota, the Latin name, was perhaps derived from *caro*, flesh, and *carota* is mentioned by Apicius, the celebrated author on cookery (A. D. 230). Some writers, however, say that it is derived from *car*, the Celtic for red. This seems highly improbable, as it is doubtful if the Celtic race cultivated any vegetable so far back as the date given above for Carota, from which Carrot is doubtless derived. The Persian names for the root are *Zardak* and *Gazar*, its Sanskrit *Garjaru*, and its Arabic *Jegar*, words in all likelihood obtained from one source, and that probably the Sanskrit. Persian scholars, at all events, accept *Gazar* as a simple Sanskrit word, and not a derived one, but the modern *Zardak* is said to come from *zar*, golden, or *zard*, yellow. The resemblance of the Kashmír name *Mor múj* to some of the European names, noteably the Russian *Morkov*, is remarkable.

Carrots appear to have been regularly used in India in the time of Akbar (corresponding to the period of Queen Elizabeth in England). They are alluded to among the vegetables and pickles used by the Emperor, but there occurs also the word *Shaqáqul*, which both Gladwin and Blochmann have translated "wild carrots," though, as already shown, this translation is most probably incorrect. While much reliance cannot be put on names of plants, as historic evidences, it is significant that throughout the languages of India, indeed, from Central Asia to Cape Comorin, there should prevail in every language a name for the carrot which seems to have come from a common source. To that name is frequently added a further word meaning "root" or "tuber." Thus, in Tamil, it is the *Gajjara-kelangu*, the *Kartu-kizhangi*. Whether or not we view *Kartu* as an approximation to the European derivatives Carota, Carrot, &c., the further explanatory word simply means tuber or bulb. In this connection it may be added that Ainslie, who wrote of Madras at the beginning of the present century, gives the Tamil for Carrot as *Cárrot-kúlung*. The Telegu language, among many other names for the carrot, has the following: *Gajjara-gedda, pita-kanda,* and *shikhá-mulamu*. Here, again, the terminal words *gedda* (or rather *gadda*) and *mulamu* (the Sanskrit *mulam*) simply mean root or rhizome, and are the equivalents of *jar* in Hindustani, *vér* in Tamil, and *véru* in Telegu. The derivation of the Latin name *Carota* mentioned above, as is customary with writers on this subject, has been given as *caro*, flesh, but the evidence of cultivation would almost lead to the inference that the carrot spread from Central Asia to Europe, and if so it might be possible to trace from the Indian, Sanskrit, and Persian names those of Europe. Ainslie has no hesitation in affirming that India obtained the carrot from Persia, but in the *Ain-i-Akbari* Abul Fazl makes no mention of carrot as having been introduced. While he goes into details regarding many of Akbar's fruits and vegetables, specially mentioning those, such as the pine-apple, which were less known, he treats carrots as a matter of course. The Muhammadan invaders of India were perhaps, for centuries before Akbar's time, equally familiar with the *Garjara, Gazar, Gajir, Zardak*, the golden root, and thus, as a regular vegetable, it was grown and eaten in India when in Europe it was scarcely known as more than a wild plant. As a somewhat curious historic fact it may in conclusion be stated that in the reign of James the First ladies adorned their head-dresses with carrot leaves, the plant having begun to be cultivated in England during Queen Elizabeth's time. It was largely grown in many parts of the Continent of Europe some time before it found its way to England. Belgium and Holland may especially be mentioned, since in these countries, even at

the present time, it is a recognised field crop, whereas in England as a whole it has not left the domain of garden production.

ABSTRACT OF THE PUBLISHED STATEMENTS REGARDING CARROT CULTIVATION IN INDIA

CULTIVATION. 175

Bombay Presidency.—Of Gujarat it has been said that carrots of two kinds are cultivated, "the long-rooted" and the "blunt spindle form" These are "grown at various times in different parts of the province

months after the ordinary time of maturity The young plants are also taken up in their half growth for the market The produce is from 5 000 to 10,000lb " The carrot is further stated to be sown in Gujarat from Of Cutch it is Cutch is famous p of water and black soil in the , both raw and boiled It is also slit and dried in the sun, when it will keep five or six months When sun-dried it is called *usris*, and has to be boiled before it is eaten" In garden lands the carrot may be sown in Poona at any time, but in dry crop lands in July or August only In Khandesh "the carrot is widely grown and with great success The chief Khandesh

being in the

the crop obtained three months later. "During the first two months the crop is watered every ten days In the third month the root begins to ripen and watering is stopped A full-sized carrot is four or five inches long and weighs about two ounces

Hyderabad. 176

Hyderabad, Sind—In the experimental farm various kinds of imported carrots have been experimentally grown The Altringham was found to give the best results, the yield having been in 1885-86 (*Farm Report, page 35*) 7,360lb an acre

Mysore 177
Coorg 178

Mysore and Coorg are stated to produce a very good quality of carrots, in the *Central Provinces* occasional references occur to carrots as

Central Provinces. 179

DAUCUS Carota.

The Carrot.

CULTIVATION.

a garden crop. In the *Bengal Gazetteers* and other publications mention is also made of carrots. In Rungpore, for example, they are said to be sown in October and November, the crop being gathered in March and April, but in Patna they are said to be sown in July and harvested in December and January. Of the *Panjáb* brief notices are made of carrot cultivation. In Jhang, for example, it is said that "the zamindar's food consists largely of carrots" (*Replies to the Famine Commission, page 228*). In Sialkot carrots "are grown all over the district, but the superior kinds of English carrots are little known or appreciated." In Hazara the carrot is sown in September and October and gathered in December and January.

Panjab. 180

N.-W. P. and Oudh. 181

The N.-W. Provinces and Oudh.—It has been estimated that there are 30,962 acres under carrots in these provinces, 2,557 acres being dry land and the remainder irrigated. In Oudh 35,721 acres, of which 3,599 are on dry land. Similar figures for the other provinces of India are not available; *but as the carrot is very nearly cultivated to the same extent in most provinces an approximate idea of the total area under carrots may be assumed.* In the N.-W. P. Agricultural Farm Report (*1884-85, page 17*) useful information is given regarding experiments made in the cultivation of European and the so-called indigenous carrot. The following results were obtained:—

	Outturn per acre in maunds.	Manure.	Ploughings.	Weedings.	Waterings.
Belgian Carrots—					
On ridges . .	153·5	Poudrette 250 maunds per acre.	5	6	7
On lines . .	113·8				
Country Carrots—					
On ridges . .	355·3				
On lines . .	315·5				

The country thus gave at least double the return of the imported. The seed was sown in September and October, and the crop obtained in November and December. Of Meerut it is said that carrot cultivation is becoming more general. In 1870 there were 250 acres, and in the replies to the Famine Commission it was contended that carrots were "most useful under failure of *kharif*."

Assam. 182 Burma. 183 Madras. 184

Of *Assam, Burma,* and *Madras* little can be learned regarding carrot cultivation, and it seems probable that, in these provinces, the root is only raised as a garden vegetable. Of Burma the Director of Land Records and Agriculture reports:—"It is planted at the beginning and reaped at the end of the rainy season. The soil required for its cultivation is a porous, moist, sandy one." It is only grown in Burma to a small extent.

FAMINE CROP. 185

ARGUMENTS REGARDING CARROT CULTIVATION AS AN EMERGENT CROP AT SEASONS OF THREATENED SCARCITY OR FAMINE.—The following may be given as a brief abstract of the leading facts and arguments advanced in Sir E. C. Buck's report on this subject, to which reference has been made above:—"In the half-yearly agricultural report in the N.-W. Provinces, published in the local Gazette of September last, I adverted to the extension of carrot cultivation which had taken place in consequence of the failure of the *kharif* in 1877." The replies received from enquiries instituted all over these provinces "corroborate the ideas which had been formed of the reliance placed by the agricultural population upon carrots, and to a less extent upon radishes, under failure of the ordi-

FAMINE CROP

nary autumn harvest The reason is simple When the *kharif* grain crops fail and food stocks are reduced to a low ebb the people have little to depend upon for food, unless purchased at a ruinous price, until March, when the spring harvests are gathered But carrots and radishes can

power The facts gleaned by the enquiries are, that in the upper portions of the provinces where the failure of the *kharif* was greatest, the cultivation of the carrot rose to three or four times the ordinary extent, and would have increased much more had seed been obtained The price of seed rose from R7 or 8 a maund to R30 or 40 a maund, and in some

, where
carrot
n that
would
Carrots

must, however, be supplemented by some grain, but it may be presumed that a supply of grain (the outturn of about two acres) sufficient for ten persons for 200 days could be made to satisfy twenty persons for the same

The above estimate is framed on
ds an acre, which is much below
300 maunds an acre not being
100 maunds of nourishing fodder

for cattle The English outturn runs up to 20 to 30 tons or from 500 to 700 maunds an acre " "I was informed that it was in the year of scarcity, 1869, that the Rohilkhand population first took the idea extensively from the cultivators of the Meerut side, and I am convinced from private enquiries that the practice is less common in the south than in the north of the provinces " Mr T N Mukharji, who, under Sir

during such an emergency, thus —*1st*, carrots give a large amount of food in a small area, *2nd* they afford food to both men and cattle, *3rd*, they save the ryots from the hands of the baniyas to whom they are bound to give up all grain, the baniyas will not take carrots on account of their not keeping

In concluding this brief notice of the existing information regarding

DAUCUS Carota.

The Carrot.

FAMINE CROP.

cial stocks might be carried on alongside of continuous efforts to acclimatise European seed of good quality. **Sir Edward Buck's** farther remarks regarding the discovery of what parts of the south of Europe could afford seed suitable to India might also receive consideration, for it is clearly a desirable feature of a subject, like that of extended carrot cultivation, to know the producers to whom application should be made for seed, and this can only be learned after extensive comparative tests have been carried out.

OIL. Seed. 186

Oil.—Carrot SEED yields a medicinal oil; this is obtained by distillation. It is a pale-yellow volatile oil and may be said to be the chief property of the seeds. It has a strong penetrating odour and a warm and somewhat unpleasant taste.

MEDICINE. Seeds. 187 Leaves. 188 Roots. 189

Medicine.—The carrot is not officinal in the English nor Indian Pharmacopœias, but by the natives the SEEDS are considered a nervine tonic. Boiled with honey and fermented, they produce a spirituous liquor. A decoction of the LEAVES and seeds is said to be used as a stimulant to the uterus during parturition. The ROOTS are made into a marmalade which is considered refrigerant. **Dr. Dymock** writes that "in the Concan a poultice of carrots and salt is used in tetter, and the seeds are eaten as an aphrodisiac." Formerly the carrot seeds (fruits) were used in European medical practice, and they are so still in America. They possess aromatic, stimulant, and carminative properties, and were used in diseases of the kidney, flatulent colic, dropsy, &c. A poultice made of the roots is even at the present day resorted, in domestic medicine, to correct the discharge from ill-conditioned sores. The raw rasped root is also deemed useful as a stimulating application, and is made into an ointment with lard. This is used in burns and scalds to good effect. Pickled-carrots are much lauded by Persian writers as a cure for spleen. In the *American Dispensatory* it is stated that the wild root may be substituted for the seeds. It is whitish, hard, branched, and possesses a disagreeable smell.

Pickled. 190

SPECIAL OPINIONS.—§ "The crushed roots form the vehicle for many medicines used by native Hakims, and have the reputation of having tonic properties" (*Narain Misser, Kothe Bazar Dispensary, Hoshangabad, Central Provinces*). "The raw carrot when eaten acts as a mechanical anthelmintic" (*Surgeon Major D. R. Thomson, M.D., C.I.E., Surgeon, 1st District, Madras*). "Poultice of the root is useful in chronic and fœtid ulcers" (*Surgeon Major George Cumberland Ross, Delhi*). "Boiled and given to cattle with the view of making them fat" (*Assistant Surgeon Annund Chunder Mookerji, Noakhally*). "The seeds are used to bring about abortion. The roots are used as poultice" (*Surgeon Major Robb, Civil Surgeon, Ahmedabad*). "Used in dysentery and enlargement of spleen" (*John McConaghy, M.D., Civil Surgeon, Shahjahanpore*).

CHEMISTRY. 191

Chemistry of the Carrot.—"The constituents of the root are crystallisable and uncrystallisable sugar, a little starch, extractive, gluten, albumen, volatile oil, vegetable jelly or *pectin*, malic acid, saline matters, lignin, and a peculiar crystallisable, ruby-red, neutral principle, without odour or taste, called *carotin*. This latter principle has been well studied by Husemann, who gives it the formula $C_{18}H_{24}O$. Husemann has also described a colourless compound, *hydrocarotin* $C_{18}H_{30}O$, which exists with *carotin* in the juice of the carrot, and is probably changed into the latter by oxidation as the plant develops in growth." "The substance called *vegetable jelly* was by some considered a modification of gum or mucilage, combined with a vegetable acid. **Braconout** found it to be a peculiar principle, and named it *pectin* from the Greek πηκτις expressive of its characteristic property of gelatinising. It exists more or less in all vegetables, and is

CHEMISTRY.

abundant in certain fruits and roots from which jellies are prepared It

	Nitrogenous compounds	Oil	Respiratory compounds	Fibre.	Ash	Water
Oats	11.85	5.89	57.45	9.00	2.72	13.09
Wheat	11.48		73.52	0.68	0.82	13.50
Hay	9.40	2.56	38.54	29.14	5.84	14.30
Carob bean	3.11	0.41	62.51	18.60	2.80	12.57
Carrot	1.87		9.91	3.07	1.11	86.04
Turnips	1.27	0.20	4.07	1.08	1.71	91.47

presented.

Carrots contain starch, the granules of which are very small and round, and in some cases muller-shaped, with distinct central hilums (*Bell*).

FOOD Root. 192

Food and Fodder.—The so-called ROOT, as produced in garden cultiva-

FODDER. 193

Coffee is often largely adulterated with carrots, and the reputed use of carrots as an adulterant in marmalade, doubtless rests on the presence of the vegetable jelly referred to above under the paragraph—"Chemistry of the Carrot."

DOMESTIC. Tooth-sticks. 194

Domestic Uses.—The peduncles and flower-stalks are used by the hill-tribes as tooth-sticks.

195

Davallia, *Smith; Hooker and Baker, Synopsis Filicum, 88; Beddome, Ferns, British India and Ceylon, p. 58.*

A genus of handsome ferns named in honour of the Swiss botanist Davall, the chief characters of which are the creeping rhizome and the involucre impressed in the substance of the margin of the frond so as to form an urceolate cyst like a miniature capsule. The economic history of Ferns is extremely imperfect. The above brief notice has been thought desirable so as to assign a place and number in the present work for one of the most extensive and most elegant of the genera, in the hope that with the advance of knowledge, we may be able to mention the uses to which some of the species are put.

Deadly Nightshade, *see* Atropa Belladonna, *Linn.*; Vol. I., No. 1614.

Deal, *see* Fir, Pine, and Pinus.

DEBREGEASIA, *Gaud.; Gen. Pl., III., 390.*

196

Debregeasia hypoleuca, *Wedd.; Fl. Br. Ind., V., 591;* URTICACEÆ.

Syn.—DEBREGEASIA BICOLOR, *Wedd., in DC. Prod.;* URTICA BICOLOR, *Roxb.;* BOEHMERIA SALICIFOLIA, *Don.;* B. HYPOLEUCA, *Hochst.;* MISSIESSYA HYPOLEUCA, *Wedd., in Ann., Sc. Nat.;* MOROCARPUS SALICIFOLIUS, *Blume.*

Vern.—*Puruni,* N.-W. P.; *Tashiári* or *tashari siar,* KUMAON; *Sihárú,* KANGRA; *Kharwala, shakai,* TRANS-INDUS and AFG.; *Chainchar, chairyili* or *chenjúl, ariser, sandári,* JHELUM; *Sansárú, siiss,* CHENAB; *Siarú, talsiari, thana,* RAVI; *Pincha, frin, siárú,* SUTLEJ.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 656; Brandis, For. Fl., 405; Gamble, Man. Timb., 326; Stewart, Pb. Pl., 215; Aitchison, Cat. Pb. and Sind Pl., 136; Atkinson, Him. Dist., 317, 798; Report on Fibres shown at the Colonial and Indian Exhibition by Cross, Bevan, King, and Watt, p. 52; Special Report furnished by the Conservator of Forests, N.-W. P.*

Habitat.—A large shrub of the western temperate Himálayas, from Kashmír and the Salt range to Kumaon, altitude 3,000 to 5,000 feet. Distributed to Afghánistán and Abyssinia.

FIBRE. 197

Fibre.—All the species of Debregeasia afford strong and useful fibres, which are more or less extracted by the hill tribes and used for ropes and cordage. Our knowledge of these fibres is, however, too imperfect to allow of separate accounts being given, in which the comparative merits of the fibres from the various species would be discussed. It has, therefore, been thought desirable to draw up in one place a brief review of all the opinions which have been published regarding these fibres, but it must be added that, should hopes ever be entertained of the utilisation, commercially, of Debregeasia fibre, the first step would naturally be to have the individual properties of the species thoroughly investigated. In general terms it may be said that writers on Panjáb products, who refer to a Debregeasia fibre, are speaking of **D. hypoleuca**; descriptions dealing with the Central Himálayas (*e.g.*, Kumaon, Garhwal, and Nepal) refer to **D. hypoleuca** and **D. velutina**; of the Eastern Himálayas (*e.g.*, Sikkim, Assam, and Burma

FIBRE.

to **D. velutina** and **D. Wallichiana**; while the **Debregeasia** fibre of the mountains of Western and Southern India is exclusively **D velutina.**

commodity The fibre is valued for net ropes, on account of its resisting the action of water The fibre, it would appear, is prepared by the hill people without steeping It is merely dried, and when brittle is beaten, the fibre separates easily, the plant is cut in October" "But **Dr Royle** [illegible] Agent at Sabathu, who describes the [illegible] The plant being cut is exposed [illegible] ilk is then stripped of its leaves and [illegible] ed in a vessel with water and wood- [illegible] r boiling the fibre is well washed in a stream The fibre is then sprinkled with flour of the grain *kodra* (**Paspalum scorbiculatum**) and left to dry it is then ready for spinning" **Capt Huddleston** [illegible] the Hemp of the [illegible] *kubra* to be alludn [illegible] northern parts of [illegible] middle ones; and [illegible] their cattle and snow-sandals One bundle will produce about a seer of fibre, but it is not collected for sale The plant grows about eight or nine feet high, and the stalks are about the size of a finger in thickness [illegible]

as 7,000 feet, and is particularly abundant in the Siwaliks It yields a very strong cordage fibre" **Brandis** (in his *Forest Flora of North-Western and Central India*) says—"Twine and ropes are made of the fibre" **Gamble** also repeats this statement, but on the other hand the Conservator of Forests of the North-Western Provinces, in a recent report, writes of Jaunsar forests that **D hypoleuca** is "not used for fibre"

Considerably more information is available regarding **D. velutina** In [illegible]

(*Bombay* [illegible] says it is [illegible] inner bar[illegible] fishing lines"

Of **D. Wallichiana, Mr Gamble** makes the statement that it yields a "fibre used sometimes for cordage"

The reader is referred for further particulars to the Selections of the

Records of the Government of India, in the Department of Revenue and Agriculture (Vol. I., No. 18 of 1888-89), where, under the heading of Rhea and allied Rhea fibres, the writer endeavoured to clear up the ambiguity that prevails regarding **Boehmeria, Villebrunea,** and **Debregeasia.**

FODDER. 108

Fodder.—Stewart mentions that the leaves are eaten by sheep.

TIMBER. 109

Structure of the Wood.—Soft and grey: of no value.

200

Debregeasia velutina, *Gaud.; Fl. Br. Ind., V., 590; Wight, Ic., t. 1959.*

Syn.—DEBREGEASIA LONGIFOLIA, *Wedd., in DC. Prod.;* MISSIESSYA VELUTINA, *Wedd., in Ann. Sc. Nat.;* MOROCARPUS LONGIFOLIA, *Blume;* URTICA LONGIFOLIA and ANGUSTIFOLIA, *Blume; Burm.;* ? URTICA BICOLOR, *Wall.;* U. VERRUCOSA, *Moon.;* CONOCEPHALUS NIVEUS, *Wight, Ic., t. 1952; Dalz. and Gibs., Bomb. Fl., 239.*

Vern.—*Tashiari*, NEPAL; *Kamhyem*, LEPCHA; *Kapsi*, BOMB.; *Kapsi*, KAN.; *Pwot-chaubeng, putchaw*, BURM.

References.—*Brandis, For. Fl., 405; Kurz, For. Fl. Burm., II., 428; Beddome, Fl. Sylv. (Man. 226, t. 26, f. 5); Gamble, Man. Timb., 326; Dalz. & Gibs., Bomb. Fl., 239; Lisboa, U. Pl. Bomb., 126, 234; Madras Man. Adm., I., 313.*

Habitat.—A tall shrub of the sub-tropical Himálaya, from Kumaon to Sikkim, Assam, the Khásia Hills, Tenasserim, the Deccan Peninsula from the Concan to Cape Comorin; altitude on the Himálaya from 2,000 to 5,000 feet, on the Nilghiri hills 7,000 feet.

FIBRE. 201

Fibre.—See the paragraph above under **D. hypoleuca.**

TIMBER. 202

Structure of the Wood.—Heartwood reddish-brown, hard; sapwood white.

203

D. Wallichiana, *Wedd.; Fl. Br. Ind., V., 591.*

Syn.—DEBREGEASIA LEUCOPHYLLA, *Wedd., in DC. Prod.;* MOROCARPUS WALLICHIANUS, *Kurz;* MISSIESSYA WALLICHIANA, *Wedd.;* URTICA LEUCOPHYLLA, *Wall.*

Vern.—*Púrúni*, NEPAL; *Senén*, LEPCHA.

References.—*Kurz, For. Fl. Burm., II., 428; Gamble, Man. Timb., 326; Thwaites, En. Ceylon Pl., 262.*

Habitat.—A small tree (20 to 30 feet in height) met with in the Eastern Himálaya from Sikkim to the Khásia hills, Pegu, and Tenasserim; altitude 2,000 to 4,000 feet. (*Fl. Br. Ind.*) Gamble says it even ascends to 7,000 feet.

FIBRE. 204

Fibre.—See the paragraph above under **D. hypoleuca.**

TIMBER. 205

Structure of the Wood.—Annual rings distinctly marked by a white line. A very pretty plant with round leaves of the purest white beneath.

206

DECAISNEA, *Hook. f. & Thoms.; Gen. Pl., I., 42.*

Decaisnea insignis, *Hook. f. & Th.; Fl. Br. Ind. I., 107;* [BERBERIDEÆ.

Syn.—SLACKEA INSIGNIS, *Griff. Itn. Not., 187.*

Vern.—*Lúdúma*, BHUTIA; *Nomorchi*, LEPCHA.

References.—*Hooker's Him. Jour., II., 197; Balfour, Cyclop., I., 902; Treasury of Bot., 388.*

Habitat.—An erect shrub, which inhabits the eastern parts of the Himálaya, in Bhutan and Sikkim, in altitudes between 6,000 to 10,000 feet.

FOOD. Fruit. 207

Food.—Produces a very palatable FRUIT, which ripens in October, and which is eaten by the Lepchas of Sikkim.

Decamali Gum—see **Gardenia lucida.**

DEER: *Jerdon, Mammals of India, p. 248.*

208

The name Deer is applied to a group of Ruminant Mammals characterised by possessing osseous solid horns or antlers, which are shed annually, at a period contemporaneous with the renewal of the hair, also by the absence of a gall-bladder They constitute the family CERVIDÆ, ... a bony ... ial horn ... he posi ... differ- ... families ... gard the

deers —

FAMILY CERVIDÆ

SUB FAMILY I —Cervinæ.—THE STAGS PROPER.

Stags. 209

Genus CERVUS —(1) C. Wallichii, the Kashmir Stag; and (2) C. affinis, the Sikkim Stag

SUB FAMILY II —Rusinæ.—THE RUSINE STAGS

Genus RUCERVUS —(3) R Duvaucelli, the Swamp Deer, and (4) R Eldii, the Manipur Stag
Genus RUSA —(5) R Aristotelis, the Sambar Stag
Genus AXIS —(6) A maculatus, the Spotted Deer, (7) A. porcinus, the Hog Deer
Genus CERVULUS —(8) C. aureus, the Rib-faced or Barking Deer.

FAMILY MOSCHIDÆ —THE MUSK DEER

Musk Deer. 210

Genus MOSCHUS —(9) M. moschiferus

FAMILY TRAGULIDÆ —THE CHEVROTIANS OR DEERLETS

Deerlets. 211

Genus TRAGULUS —(10) T Napu, the Javan Deerlet
Genus MEMINNA —(11) M indica, the Indian Mouse-deer.

Reference has been made above to the difference of opinion that pre-

contended that some of the members of the genus AXIS have been found to

Sheep, and Oxen

The above brief indication of the classification (in a work on Economic Products) has been deemed necessary from the difficulty that exists in grouping the skins, horns, antlers, musk, &c, according to some stand-

and that would be found to correspond with the arrangement adopt in the classification of the animals in purely Zoological Museums.

It is not intended, in this work, to deal with sport, but it may be wor mentioning (in connection with the subject of domestication) that in t *Ain-i-Akbari* an interesting account will be found of the fighting-de kept by the Emperor, also of the sport of hunting for these animals b means of snares attached to trained deer. It is stated that "His Majes had 12,000 deer" kept for these purposes.

The following paragraphs will be found to contain the vernacul names of the commoner species, their habitat and other peculiarities; but f further particulars regarding the Economic Products derived from the animals, the reader is referred to the following subject-headings:—"Hid and Skins," "Leather," "Horns, Antlers, and Ivory." For the Bovir animals to "Oxen," and to "Sheep and Goats."

Axis maculatus (*Jerdon, Mam.*, 260).

212

THE SPOTTED DEER.

Vern.—*Chital, chitra* (*chritri-jhink*, male), HIND.; *Boro-khatiya* (PURI PORE), *chatidah* (BHAGULPORE), *buriya* (GORAKHPORE), BENG.; *Sirang* BELGAUM; *Pulli maun*, TAM.; *Dupi*, TEL.; *Lupi*, GOND.; *Sarga, jat mikka*, KAN.; *Zubbi*, ARAB.; *Gouzun*, PERS.

Habitat.—Throughout the greater part of India, except the Panjáb, bu apparently not found east of the Bay of Bengal. It is met with abundant ly on the lower and outer slopes of the Himálaya, and immense herds ma be seen in the Sunderbuns. It frequents forests bordering on streams, and is gregarious, very often occurring in herds of 30 to 40 or even 100. The most elegant and graceful of Indian deer, it is said to be found only in fascinating bits of country, its dappled hide being seen to sparkle in sunlight, of the mixed bamboo glades, as it bounds from the intruder on the slightest indication of danger.

See an interesting account of this deer in the Kanara Gazetteer, page 101. It is there stated to be rapidly being exterminated.

Skin. 213 Antlers. 214

SKIN AND ANTLERS.—The skin, a yellowish or rufous fawn, spotted with white, is much admired for ornamental purposes. The antlers have the tres-tines longer than the royals or posterior tines. They are shed in February and March, and are commercially in considerable demand, but actual statistics cannot be obtained. Liverpool is said to have imported from 1851—55, 20,000 of these antlers, and during the same period 700 of the skins. The following note, furnished by Major A. E. Ward, will be read with interest:—"There is a considerable trade in the horns as well as in the skins of the spotted deer. Formerly, in the times when this deer was plentiful, some of the Cawnpore leather firms gave contracts to men who supplied *shikáris* with powder and ball, and thus ruined the shooting in many parts of the Terai and the Duns. One firm gave a wholesale price of R50 per hundred skins; and at this rate attracted many offers of sale. The flesh is exchanged by the hunters for flour, &c. The tanned leather does not wear well."

"The spotted deer is very irregular in its breeding habits. It accordingly sheds its horns at no absolutely fixed period. The horns may thus be seen to be in velvet on some individuals and quite hard in others at almost any season of the year."

FOOD. 215

Food.—The flesh "is very good eating in the cold weather months." Ainslie (*Mat. Ind.*, *I.*, 110) says, "as venison it is not worth much, unless when caught young and fed properly." In Kanara an animal on account of its flesh is said to sell for R5-8.

216

Axis porcinus (*Jerdon, Mam*, *262*)

THE HOG-DEER.

Vern.—*Para*, HIND, *Nuthrini haran* BENG, *Khar laguna*, NEPAL TARAI, but *Sugoria* is also sometimes given to it

Habitat—Throughout India, though less frequent in the central parts, abundant in Assam, Burma, and Ceylon It is seldom found in forest land, preferring open grassy jungle. It lies all day in sheltered thick parts *and only rises when run upon by the sportsman or his beaters It gets its* name of Hog-deer on account of its awkward ga t Major Ward writes that it leaves the thickets for "swampy ground directly the hot weather comes on, and may often be found in snipe jheels in the cold weather"

Skin. 217

Skin and Antlers—According to the same authority the skin of this species is not in much demand

FOOD. 218

Food.—The meat is said to be fair by some writers, but Major Ward is of opinion that it cannot be recommended His words are "This deer suffers greatly from internal parasites And although the flesh is at times fairly good, what between these intestine parasites and the fact that the skin is often pierced by the grub of the *Bot*, I think the meat cannot be recommended."

219

Cervulus aureus (*Jerdon, Mam*, *264*)

THE RIB FACED DEER, the BARKING DEER or MUNTJAC of India, the RED HOG-DEER in Ceylon

Vern—*Kakar, bherki, jangli-bukra*, HIND, *Maya*, BENG, *Ratwa*, NEPAL, *Karsiar*, BHOTIA, *Siku, suku*, LEPCHA, *Kondakuri*, BELGAUM, *Advikuri*, KAN, *Gutra, gutri*, GOND, *Bekra baikur*, or *Kekar*, MAR, *Kuka gori*, TEL, *Gee*, BURM

Habitat.—India, Burma, Ceylon, the Malay Peninsula, Sumatra, Java, Borneo, &c. Sportsmen describe this as a retiring little forest animal, generally found alone or at times in pairs, "creeping," as Hodgson remarks, through the tangled jungle or under fallen trees It is said in Kanara to love the dense shade of the *Karvi* (**Strobilanthus**) that covers Sahyádri slopes (*Kanara Gazetteer, page 102*)

Skin. 220

Skin and Antlers—Major Ward says that "the skin of the barking deer is very largely in demand, as it is very tough when tanned Shoes and leather socks are made in great numbers from it Saharanpur, Meerut, and Dehra *mochees* are the principal dealers in this hide" "The horns are too small to be of value"

Antlers. 221

FOOD. 222

Food—"It is excellent venison, but rarely carries any fat" This statement is confirmed in the *Gazetteer of Ratnagiri*, but the venison is said to be all the more appreciated in a district where mutton is scarcely attainable

223

Cervus affinis (*Jerdon, Mam*, *251*).

THE SIKKIM STAG

Vern.—*Shon*, TIBETAN

Habitat—The Eastern Himálaya (Sikkim side of Tibet, Chumbi Valley) Major Ward is, however, very doubtful if this stag is to be found at all in the Chumbi Valley. "Mr Ney Elias tells me," he writes, "that it [illegible]

Antlers. 224

DEER. **The Kashmir Stag and Musk Deer.**

225

Cervus Wallichii (*Jerdon, Mam., 250*).

THE KASHMIR STAG.

Vern.—*Barasingha*, HIND.; *Kangul* or *Honglu*, KASHMIR.

Habitat.—Kashmír, the Sind valley, to Budrawar and Kishtar eastward, inhabiting pine forests at altitudes of 9,000 to 12,000 feet, descending to lower levels in autumn and winter. The larger stags, Major Ward writes, seldom come below 7,000 feet. "In the spring this animal migrates from the valleys of Kashmír and wanders far, often crossing the lower passes, *viz.*, the Mingan, the Togila, &c. It clings, however, to country that is fairly wooded. It is rapidly decreasing in number."

Antlers. 226

Antlers.—"The horns form a portion of the tribute paid by the shikáris to the Máhárája of Jummu. The best are sold at high prices from R15 to R30 per pair, and are bought by taxidermists and collectors of horns."

227

Moschus mochiferus (*Jerdon, Mam., 266*).

THE MUSK DEER.

Vern.—*Kastura*, HIND.; *Rous, rús, kasturé*, KASHMIR; *La-lawa*, TIBET; *Rib-jo*, LADAK; *Bena*, KANAWAR; *Mussuck-naba*, PAHARI.

Habitat.—Found throughout the Himálaya at elevations above 8,000 feet: distributed to Central and Northern Asia and Siberia. The musk deer is a forest-loving animal, keeping much to one locality. It is wonderfully sure-footed and is able to leap and bound over the steepest and most broken ground. Colonel Markham (*Jour. Sporting Adventures and Travel in Chinese Tartary and Thibet*) says: "On a gentle slope I have seen them clear a space of more than sixty feet at a single bound, for several successive leaps, and spring over bushes of considerable height at the same time." It is an exceedingly shy animal of nocturnal habit, and not much larger than a greyhound. Of all ruminants it is reported to eat the least, and although no connection can be traced between the nature of the food it eats and the production of musk, it is a common opinion among traders that those reared in forest-clad countries are better than those met with in open rocky regions. It is said to eat the tangled grey lichen (*Usnea*) that hangs from trees everywhere on the higher Himálaya, and the leaves of various shrubs, as also grasses, roots, &c. Colonel Markham alludes to a popular opinion that it eats the leaves of a laurel (*kedar pattu*), probably Litsæa umbrosa, a small tree or bush frequent up to about 7,000 feet, but certainly not common at the altitudes where the musk-deer lives. Major Ward, however, repudiates this statement, characterising it as a native absurdity.

228

MUSK.

MUSC, GRAINE D'AMBRETTE, *Fr.*; MOSCHUS, BIZAM, *Germ.*; MUSCHIO, *It.*; ALMIZELE, *Sp.*

Vern.—*Kastúri, mushk*, HIND.; *Kashtúri*, BENG.; *Kasturi*, MAR., TAM., TEL., MAL.; *Misk, mishk, mushk*, ARAB.; *Mushk*, PERS.; *Mushk náfá*, PB.; *Mriganábhi, kasturi*, SANS.; *Kado*, BURM.

References.—*Sterndale, Mam. of Ind., 494; Piesse, Art Perfumery, 246; U. C Dutt, Mat. Med., 279; Moodeen Sheriff, Supp. Pharm. Ind., 177; Pharm. Ind., 282; U. S. Dispens., 15th Ed., p. 962; Baden Powell, Pb. Prod., 189; Ainslie, Mat. Ind., I., 228; Ure, Dict. Arts, &c., III., 213; Balfour, Cycl. Ind., 1021; Spons, Encycl., 1524; Davies, Trade and Resources of the N.-W. Boundary of India, CCXXXVII.*

DESCRIPTION 229

Description.—"The musk is milky for the first year or two, afterwards granular; the dung of the males smells of musk, but the body does not, and the females do not in the slightest degree." "The musk-deer is

DESCRIPTION.

much sought after for its musk, many being shot and snared annually
rupees The musk as sold
&c One ounce is about the
tomical details of interest (by
Dr Campbell) may be here given — The musk bag lies at the end of

best both in appearance and smell if the pod is at once cut from the skin, and allowed to dry of itself " Mr. F. Peak (of Peak Allen & Co) wrote to M—
skin
gets
both
the hairy-skin was declared to be far superior " Referring to the process of drying skin around the pods he adds · "By the continued heat much of its odour is driven off, and it is consequently deprived of its qualities as a remedial agent, and for the use of the perfumer is greatly deteriorated " (*See also Peak P. J Tr , Feb 1861*)

ADULTERATION. 230

Adulteration —The extent to which musk adulteration has been carried seems natural enough, especially at the present time, when nearly every commercial article is counterfeited to some extent The high price paid for the perfume, the uncertainty of the supply, and the difficulty of detection must have all naturally tended to suggest a certain amount of adulteration

real pods, and its place supplied by some other substance, and these are difficult to detect even if cut open, as whatever is put in is made to resem-

ADULTERATION.

ble musk in appearance, and a little genuine added makes it smell nearly as strong. Some have only a portion of the musk taken out, and its place thus supplied; and others have all the musk left in, but something added to increase the weight." The above description of the process and materials of adulteration differs but little from that written in 1596 by **John Huygen van Linschoten.** That early traveller was misinformed when he stated that the true musk was the testicles of the animal, and this mistake his contemporary, **Dr. Paludanus**, corrected. He wrote: "Some are of opinion that muske groweth at certaine times of the yeare about the navell." But **Linschoten's** account of the Chinese adulteration of the article, traded in by the Portuguese at so early a date, is worth quoting in this place. He says that having killed the animals "they let them lie and rot, blood and flesh together: which done they cut them in pieces both skinne, flesh and blood, all mixed togeather, and thereof make divers purses, which they sow (in a round forme) and are in that sort carried abroad and sold. These purses are commonly of an ounce waight the peece, and by the *Portingales* are called *Papos,* but the right *Papos* and perfect *Mosseliat* is the bullockes or stones of the beast, the others, although they passe among them for *Mosseliat,* are not so good as the stones: therefore the Chinaes (Chinese) who in all thinges are very subtill, make the purses cleane round, like the stones of the beaste, therewith to deceive the people, and so the sooner to procure them to buy it." So again he says: The Chinaes are very deceitful in selling of *Mosseliat* (or Muske), for they folsife it verie much, sometimes with oxen and cowe's livers, dried and beaten to powder, and so mixed with the *Mosseliat,* as it is dayly found by experience in searching of it."

COMMERCIAL FORMS.
Cabardien. 231
Assam. 232
Tonquin. 233

Commercial Forms of Musk.—Piesse says there are three kinds, *viz.*—"The *Cabardien,* or Russian Musk, which is rarely, if ever, adulterated; from its poorer fragrance, however, it does not fetch more than 8*s.* an ounce in the pod. The *Assam Musk* is next in quality: it is very strong, but has a rank smell: the pods are very large and irregular in shape: it fetches about 24*s.* per ounce in the pod. The *Tonquin* or Chinese Musk yields the kind mostly prized in England, and is more adulterated than the former; market price from 26*s.* to 32*s.* per ounce in the pod." Further on **Mr. Piesse** again refers to the Assam Musk:—"The musk of Assam and South Thibet reaches Europe by way of Calcutta. It is sent in bags enclosed in a chest of wood or tin-plate, which holds about two hundred pods. The form of this musk is more valuable than that of the Nankin musk." Although **Mr. Piesse** publishes extracts from his correspondence with Peak, Allen and Co. regarding Himálayan musk, he does not (*in his Art of Perfumery*) furnish any information as to the comparative value of Himálayan and Assam. **Dr. U. C. Dutt** says that, according to Sanskrit literature, there are three kinds of musk—"The *Bhávaprákása* describes three varieties of musk, namely, *Kamrupa, Nepála,* and *Káshmira* musk. Kámrupa musk is said to be of black colour and superior to the others. It is probably China or Thibet musk brought to India *viá* Kamroop in Assam. Nepála musk is described as of a blueish colour and intermediate quality. Káshmira is of inferior quality."

Panjab Musk. 234

The following note, regarding Panjáb musk, has been obligingly placed at the writer's disposal by **G. G. Miniken, Esq.,** Deputy Conservator of Forests:—

"In Bashahr on the Sutlej and on the Rupin and Paber rivers, the Musk-deer was at one time plentiful, but it is generally stated that it is not now so numerous.

"The right of hunting the musk-deer belongs to the Rajah, and he employs trained shikáris to hunt them; but this right is in truth not respected.

COMMERCIAL FORMS.

Villagers all over the country shoot for themselves, and the pods obtained are sold to chemists at Simla and Masouri The Rajah's shikâris use nets which are set up across some gap or glade in the forest, and with dogs drive the deer into the nets where they are shot, and the pod extracted from the male while it is hot. The musk is said to be of better quality if

applied; but if too much is put on the wound, the flesh swells. Musk mixed with '*ghi*' called in the plains *Hawan samaghri* is used to scent rooms, and to keep off bad air. It is also burnt as incense in temples Bushahiris smoke it mixed with tobacco, and it is said to have a mild intoxicating effect. But it is especially prized for its stimulative action when taken internally, particularly for incompetence. It is useful for pains in

to Rampur

TRADE. 235

Indian Trade in Musk—The extent of the internal trade in musk cannot be discovered, but as the animal is systematically hunted all over the region where it occurs, and the so-called musk-pods are to be had in every drug-seller's shop, the consumption must be very extensive.

Mr. Baden Powell says that "about 100 musk-bags are imported

and the Panjâb find their way to Câlcutta. But, as stated, an elaborate compilation from all the Trans-frontier Land Trade Reports, Railway and River-borne Trade, and of all other such sources of information,

DEER. | Musk and

ADULTERATION.

ble musk in appearance, and a little genuine added makes it smell nearly as strong. Some have only a portion of the musk taken out, and its place thus supplied; and others have all the musk left in, but something added to increase the weight." The above description of the process and materials of adulteration differs but little from that written in 1596 by **John Huygen van Linschoten**. That early traveller was misinformed when he stated that the true musk was the testicles of the animal, and this mistake his contemporary, **Dr. Paludanus**, corrected. He wrote: "Some are of opinion that muske groweth at certaine times of the yeare about the navell." But **Linschoten's** account of the Chinese adulteration of the article, traded in by the Portuguese at so early a date, is worth quoting in this place. He says that having killed the animals "they let them lie and rot, blood and flesh together: which done they cut them in pieces both skinne, flesh and blood, all mixed togeather, and thereof make divers purses, which they sow (in a round forme) and are in that sort carried abroad and sold. These purses are commonly of an ounce waight the peece, and by the *Portingales* are called *Papos,* but the right *Papos* and perfect *Mosseliat* is the bullockes or stones of the beast, the others, although they passe among them for *Mosseliat*, are not so good as the stones: therefore the Chinaes (Chinese) who in all thinges are very subtill, make the purses cleane round, like the stones of the beaste, therewith to deceive the people, and so the sooner to procure them to buy it." So again he says: The Chinaes are very deceitful in selling of *Mosseliat* (or Muske), for they folsife it verie much, sometimes with oxen and cowe's livers, dried and beaten to powder, and so mixed with the *Mosseliat,* as it is dayly found by experience in searching of it."

COMMERCIAL FORMS. Cabardien. 231 Assam. 232 Tonquin. 233

Commercial Forms of Musk.—**Piesse** says there are three kinds, *viz.*—"The *Cabardien*, or Russian Musk, which is rarely, if ever, adulterated; from its poorer fragrance, however, it does not fetch more than 8*s*. an ounce in the pod. The *Assam Musk* is next in quality: it is very strong, but has a rank smell: the pods are very large and irregular in shape: it fetches about 24*s*. per ounce in the pod. The *Tonquin* or Chinese Musk yields the kind mostly prized in England, and is more adulterated than the former; market price from 26*s*. to 32*s*. per ounce in the pod." Further on **Mr. Piesse** again refers to the Assam Musk: -"The musk of Assam and South Thibet reaches Europe by way of Calcutta. It is sent in bags enclosed in a chest of wood or tin-plate, which holds about two hundred pods. The form of this musk is more valuable than that of the Nankin musk." Although **Mr. Piesse** publishes extracts from his correspondence with Peak, Allen and Co. regarding Himálayan musk, he does not (*in his Art of Perfumery*) furnish any information as to the comparative value of Himálayan and Assam. **Dr. U. C. Dutt** says that, according to Sanskrit literature, there are three kinds of musk—"The *Bhávaprákása* describes three varieties of musk, namely, *Kamrupa, Nepála,* and *Káshmira* musk. Kámrupa musk is said to be of black colour and superior to the others. It is probably China or Thibet musk brought to India *viá* Kamroop in Assam. Nepála musk is described as of a blueish colour and intermediate quality. Káshmira is of inferior quality."

Panjab Musk. 234

The following note, regarding Panjáb musk, has been obligingly placed at the writer's disposal by **G. G. Miniken, Esq.**, Deputy Conservator of Forests:—

"In Bashahr on the Sutlej and on the Rupin and Paber rivers, the Musk-deer was at one time plentiful, but it is generally stated that it is not now so numerous.

"The right of hunting the musk-deer belongs to the Rajah, and he employs trained shikáris to hunt them; but this right is in truth not respected.

COMMERCIAL FORMS.

Villagers all over the country shoot for themselves, and the pods obtained are sold to chemists at Simla and Masouri The Rajah's shikáris use

soft mass The test of genuine musk is made by passing a thread through

applied; but if too much is put on the wound, the flesh swells. Musk mixed with *'ghi'* called in the plains *Hawan samaghri* is used to scent rooms, and to keep off bad air It is also burnt as incense in temples Bushahiris smoke it mixed with tobacco, and it is said to have a mild intoxicating effect But it is especially prized for its stimulative action when taken internally, particularly for incompetence It is useful for pains in

to Rampur

TRADE. 235

nto the North-West Provinces But, as stated, an elaborate and Trade Reports, Railway such sources of information,

TRADE.

would fall short of the actual mark, since a small expensive article like that of musk must be extensively trafficked in outside the limits of possible commercial statistics. Calcutta is, however, the chief emporium of the trade, and some conception of its total extent may be gathered from the figures of Foreign Exports by Sea from India, which, it may be repeated, represent the surplus over and above Indian consumption. Last year (1887-88) India exported 2,144 ounces valued at R72,116, and of that amount only R20 worth left Bombay, the rest being exported from Bengal, and R61,226 worth were consigned to the United Kingdom. The exports in 1886-87 were valued at R70,913, the smallest amount since 1878-79. The average exports for the past ten years may be taken to have been valued at R1,11,750. The total amount of musk exported from India during these years was 44,195 ounces, valued at R11,17,519. Each animal contains only one musk-pod, the average weight of which is about one ounce of musk, so that the above figures would represent an annual slaughter of about 4,500 male animals to obtain the musk exported from India. These are of course not all killed within British territory, the traders bring a large proportion from the regions on the north of the Himálayas. But on the other hand the internal or Indian consumption is not estimated for, so that it is probable the Indian trade (internal and exported) represents a slaughter of little short of 10,000 musk-deer annually. And doubtless a large number of females are caught in the snares by which the natives capture the animal, so that it is probable that nearly 20,000 are actually killed by the traders and sportsmen combined. This wholesale extermination doubtless has something to say to the visible decline in the supply and to the decrease in the exports, but it is also probable that other animal and even vegetable sources of supply are yearly coming into greater importance.

The value of the musk-pod is said to average from R10 to R15. For further particulars, in continuation with this account of the Perfume musk, see Musk in another volume, in which will be found the medicinal and chemical properties of the substance and its applications in the art of perfumery, together with information regarding the other sources of supply.

Skin. 236

Skin.—The skin of the musk-deer does not appear to be of any value. It is covered with rigid porcupine-like hairs.

FOOD. 237

Food.—The flesh of the young animal is reported to be tender and well flavoured. The female does not produce musk, but even, in the male, while the animal smells strongly and the dung also is musk-scented, the flesh is perfectly devoid of the odour, not even the stomach, nor the contents of the stomach, removed after death, partake of the characteristic smell.

238

Rucervus Duvancellii (*Jerdon, Mam., 254*).

THE SWAMP DEER.

Vern.—*Bara-singha*, HIND.; *Baraya* or *maha*, NEPAL TARAI; *Jhinkar*, KYARDA DOON; *Potiya haran*, MONGHYR; *Goen* or *goenjak* (male), *gaoni* (female), CENTRAL INDIA.

Habitat.—The forest lands at the foot of the Himálaya from Kyarda Doon to Bhotan. It is very abundant in Assam, inhabiting the churs and islands of the Brahmaputra down to the Sunderbunds. It also occurs at Monghyr, and extends sparingly to Central India. It lives in great herds, preferring the open forest land in the vicinity of rivers. According to Major Ward, it is common in Nepal, and is still to be found on the banks of the Sardah river and the islands intersecting its course near Moondea Ghát, in which neighbourhood he has shot several. Major Ward adds that years ago it used to be found in the Dehra Duns, but that none are at

present met with in those parts except considerably to the westward of Philibeet

Rucervus Eldi (*Jerdon, Mam*, 255) — 239

THE MANIPUR OR BURMA STAG, THE BROW ANTLERED OR ELD'S DEER

Vern —*Thamin*, BURM, *Sungrai* or *sungnai*, MANIPUR

Habitat —The Eastern Himálayas, Manipur, Burma, Siam, and the Malay Peninsula It is essentially a plains loving species, and though it frequents open tree jungle, it never ventures into dense tangled brushwoods, and on being alarmed takes to the open

Rusa Aristotalis (*Jerdon, Mam*, 256) — 240

THE SAMBER STAG.

Vern —*Sambar*, HIND, *Jerai*, *jerao* in the HIMALAYA, *Maha* in the TARAI, *Meru* or *Kadavi*, MAR *Kadivi*, BELGAUM, *Maoo* GOND, *Kannadi*, TELEGU, *Ghous gaoj*, EASTERN BENGAL *Schap*, BURM

References —*The account given in the Gazetteer of Kanara District will be found interesting*, *p* 100

Habitat.—Throughout India, from the Himálaya to Cape Comorin, and through Assam and Burma to the Malay Peninsula and Ceylon In the *Kanara Gazetteer* it is said of that district that the Samber is nowhere so numerous as it was ten or fifteen years ago The cause of this is said to

SKIN. 241

FOOD. 242

it comes to feed, or they lie in holes dug near tanks of water The fruits on which it specially feeds are said to be **Phyllanthus Emblica, Dillenia pentagyna, Terminalia bellerica,** and **Spondias mangifera.**

DELIMA, *Linn*; *Gen Pl*, *I*, 12

Delima sarmentosa, *Linn*, *Fl Br Ind*, *I*, 31; DILLENIACEÆ — 243

Syn —TETRACERA SARMENTOSA, *Willd*

Vern —*Mon kyourik*, LEPCHA, *Korasa wel*, SINGH

References — [illegible] 22, of 58.

Habitat —A woody climber met with in Eastern Tropical India, from Darjeeling and Assam to Singapore Kurz says it is frequent in the mixed forests of Burma from Chittagong and Pegu down to the Andamans also in Ava

DOMESTIC. 244

Domestic Uses.—The leaves of the plant are universally employed, in the countries where the plant occurs, in place of sand paper to polish wood and even metal articles

Delphinidæ, the Whale family, see **Whale.**

DELPHINIUM, *Linn.; Gen. Pl., I., 9, 953.*

A genus of annual or perennial herbs, containing some 40 species, which are distributed throughout the north temperate zone and on the temperate tracts of lofty mountains in the southern zone. The generic name, derived from the Greek *Delphinion*, arose from the somewhat fanciful resemblance of the flower-bud to the head of the Dolphin, and the English name Larkspur was doubtless occasioned through the long spur-like prolongation at the base of the flower. The common Larkspur, **Delphinium Ajacis**, takes its specific botanical name from the supposition of its petals denoting the letters, A. I. A., the initials of Ajax, the Greek Trojan hero. The Larkspur is a favourite garden annual in India. On the Himálaya it shows a distinct desire to leave the restricting influence of cultivation, and even in some parts of the plains manifests a tendency to become perennial. Withstanding the intense summer's heat of the drier areas, it may sometimes be seen to flower during winter and spring for several successive seasons. In such cases, however, it assumes a rigid bushy habit, and has small pale-coloured flowers. In fact, it alters its faces so far as to largely lose its accepted specific characteristics, and assumes some of those of **D. orientale.** **Firminger** remarks that he had "failed completely to germinate imported Larkspur seed in the plains of India." The plant must be first acclimatised in the temperate regions of India, and be brought gradually down to the plains. The stock found in the plains consists of **D. Ajacis** and **D. consolida.** The latter having larger flowers on longer peduncles and the segments of the leaves broader than the former. **Firminger** speaks of both collectively as "a poor weedy worthless thing." In a further passage he concludes:—"If the ground where Larkspurs have grown one season be left undisturbed, an abundant crop of self-sown plants will spring up the following November and December." In Bankipur (Behar), the writer carefully marked several individual plants and found that they continued to grow throughout the year, and even formed flowers during the hottest months, provided they were watered and had the partial shade from trees. In the same way a crop of lettuce was obtained at any season, and both Larkspur and lettuce produced from self-sowings the stock of seedlings for almost any month of the year. The Larkspur was thus acclimatised to one of India's dry hot tropical climates, and had practically lost its character as a temperate-loving plant. In most parts of India (preferentially the dry or non-inundated areas) it is practically a cold season garden weed, its single, faded, purplish flowers being unworthy of care and attention.

245

Delphinium Brunonianum, *Royle; Fl. Br. Ind., I., 27;* RANUNCULACEÆ.

Vern.—*Nepárí*, KUMAON; *Kastúrí*, GHARWAL; *Sapfalú* (RAVI), *laskar, spet, panni, supalú, ruskar, liokpa* (SUTLEJ), PB.; *Ládara*, LADAKH; *Laskara*, SIMLA; *Mündwál*, PANGI.

References.—*Stewart, Pb. Pl., 3; Aitchison, Kuram Valley Flora (Jour. Linn. Soc. XVIII., pp. 25, 30); Atkinson, Him. Dist., 412, 735; Royle, Ill. Him. Bot., 56; Balfour, Cyclop., I., 911; Gazetteer, Simla Dist., p. 12.*

Habitat.—A very abundant plant on the higher Western Himálaya and Tibet, at altitudes of 13,000 to 17,000 feet.

MEDICINE. Juice. 246 Leaves. 247

Medicine.—This plant is prized for its strong scent of musk. It is offered to the presiding idol of the hill temples. **Aitchison**, in his *Flora of the Kuram Valley*, remarks that the juice of the leaves of this plant are used in Kuram to destroy ticks in animals, but chiefly when they affect sheep. This is a curious fact, pointing to Stavesacre (**D. Staphisagria**, *Linn.*), which is now very largely used in Europe, and was employed both by the Greeks and Romans for a similar purpose, *viz.*, the destruction of vermin.

SPECIAL OPINIONS.—§ "In Leh it is considered so poisonous that the dew from the leaves falling on grass is said to poison cattle and horses" (*Surgeon-Major J. E. T. Aitchison, Simla*).

PERFUMERY. 248

Perfumery —Used as a substitute for Musk (which see) Atkinson (*Him Dist*, *p* 735), says "it is exported from the Kumaon Himalaya on account of its musk-scented leaves"

249

Delphinium cœruleum, *Jacq*, *Fl Br Ind*, *I*, *25*

Vern —*Dakhangu*, PB

References —*Stewart, Pb Pl*, *3* *Atkinson, Him Dist*, *328, 412*

Habitat —A slender plant with light blue flowers, met with on the alpine Himalayas, common in the Sutlej basin from 8,000 to 17,000 feet

MEDICINE. Root 250

Medicine —The ROOT is applied to kill the maggots in the wounds of goats (*Stewart*)

251

D. cashmirianum, *Royle*; *Fl Br Ind*, *I*, *26*.

Vern —*Amlin* (in RAVI BASIN), PB

Habitat —An alp ne herb met with in the Western Himálaya, Kash-

MEDICINE 252

of *bikh* and *nirbisi*, after mentioning Pæonia Emodi, Aconitum ferox, Polygonatum verticillatum, and Smilacina pallida, adds "The cylindrical tuberous roots of Delphinium kashmerianum, *Royle*, found at Pindari in Kumaon and Bhojgara, on the south side of the Kawari pass in Garwahl (11,000 to 14 000 feet), are absolutely identical with the ordinary *nirbisi* roots (*See Madden, An Mag N H, 2nd Ser, XVIII, 445*") *Conf* with D denudatum

253

D. denudatum, *Wall*, *Fl Br Ind*, *I*, *25*

Syn —DELPHINIUM PAUCIFLORUM, *Royle* (*not of* Don)

Vern —*Nirbisi* (according to Dymock), *judwar* (according to Murray), HIND, *Nilo bikh* NEPAL *Nirbisi* (of the BHOTIAS), EAST HIMALAYA, *Munila* (SIMLA), PB, *Jadwar*, *mahferfin* (according to Dymock), ARAB

Compare the above vernacular names with the remarks under Curcuma aromatica, Vol II, p 656

References —*Stewart Pb Pl*, *3* *Dymock, Mat Med W Ind*, *2nd Ed*, *11*, *Murray, Pl and Drugs, Sind, 74*, *Royle Ill Him Bot*, *55*

Habitat —An annual herbaceous plant, common on the outer ranges of the Western Himálaya, from Kashmir to Kumaon, altitude from 5 500 to 8,500 feet A denizen of the drier warm temperate tracts of the Himálaya, especially on grassy slopes, where occasional brushwood occurs on southern exposures (*Conf* with D vestitum)

MEDICINE. Root 254

Medicine —Only one modern author records the observation that the natives of India use this Delphinium medicinally—Madden wrote that the ROOT is chewed on Sundays by the people of Bashahr for tooth ache It would appear to be one of the roots occasionally collected in order to be used as an adulterant for Aconite The trade in the article is, however, extremely
the region where the
with the Bhotias of Ne
have been lagged int

DELPHINIUM denudatum.

The Nirbisi or Jadwar.

MEDICINE. Singya bikh. 255 Bikh. 256 Bikhma. 257 Nirbisi. 258

poisonous properties. He described four forms—(1) *Singya bikh*, (2) *Bish* or *Bikh*, (3) *Bikhma*, and (4) *Nirbisi*. *Bikhma*, he explained, was a powerful bitter, and Wallich subsequently identified this as Aconitum palmatum. *Nirbisi*, Hamilton affirmed, to be devoid of poisonous property, while he announced *Singya* to be the root of a Smilax, and *Bish* or *Bikh* to be a virulent poison. More recent writers have extended the list of vernacular names given to the poisonous Aconites. Thus *Singyi* or *Singyá-bish* (the horny *bis*) and *mitha-zahar* (the sweet poison) are given to two forms of Aconitum ferox, the separate properties of which are recognised by the Indian drug-sellers. Both Hindu and Muhammadan writers on Materia Medica refer to many forms of poisonous and non-poisonous aconites. Some of the former are so poisonous as to have obtained the fabulous reputation of proving fatal to the touch. Of the latter many forms are mentioned, the names given expanding until they include an extensive series of tonic medicines, many of which are in no way related to Aconitum. In a like manner the word *Bish* or *Bikh* simply means poison, the *Visha* of Sanskrit; but it became specifically restricted as a proper name to Aconite, the most poisonous of all the poisons—*Bikh* or *Bis*, *the* poison. So also *Bikhma* or *Bishma* would mean "*bikh*-like," and might be supposed to have been first applied to the less poisonous forms of Aconite, until, in the descending scale of transitions, the innocuous forms of Aconite were embraced by it, and in time also the root, or collection of roots, that ultimately received the designation of *Nirbisi*, with its synonyms in Arabic of *Jadwár* and *Mahferfin*, and in Persian of *Zadwár*. Whether or not the word *Nirbisi* means antidote, if a synonym for *Jadwár*, the root referred to must have been used as a drug to strengthen the system against poison—the alexipharmic of ancient writers. Royle wrote:—"The term *Nirbisi*, as observed by Mr. Colebrooke, implies that the drug is used as an antidote to poison, being composed of the privative preposition *nir* and *bis* poison; and in the *Makhzan-ul-Adwiya*, it is further explained as repelling from and purifying the body from poison." Commenting on the above opinion held by Mir Muhammad Husain, Dr Dymock says—"The Indian name *Nirbisi*, he (Mir Muhammad) explains incorrectly as *Nir*, the antidote to *Bish*, the poison. *Nirvisha* is a Sanskrit adjective meaning 'not-poisonous,' and *nirvisha* or *nirvishi* is never applied to Aconite by Hindu medicine writers, but denotes a peculiar sedge used as an antidote to certain poisons, *viz.*, Kyllingia monocephala, *Linn.*" According to most writers the *Jadwár* possesses alexipharmic properties, and Dr Moodeen Sheriff says—"*Jadwár* is the only safe word to use in ordering the non-poisonous aconites." He, however, remarks, *Nirbisi* is often confounded with the Sanskrit name *nir-visha*, "and this is partly from the partial analogy that exists between their pronunciation, and partly from their literal and general meaning being nearly the same. *Free from* or *without poison* is the literal meaning of *Nir-vishani* or *Nir-visha*, and the meaning generally attached to it in books is an *antidote*. The only difference between the above meaning and the meaning of *Nirbisi* is, that the Sanskrit word *Visham* or *Visha* is the common name for any poison, whatever it may be, while *bis* in Hindustani is the name of a particular vegetable poison, *viz.*, the root of Aconitum ferox."

Jadwar. 259

An antidote to Aconite poison would be a diffusible stimulant, and thus, as time went on, discovery after discovery would doubtless have expanded the list of drugs that might each deserve the name of *Nirbisi* or *Jadwár*. It may thus be safely assumed that every region and age had its favourite *Nirbisi*, and that special preparations of certain diffusible stimulants came to take the place of some particular root—the *Nirbisi* of the earlier authors. The writer had a sample of the sacred

Costus root (the root of Saussurea Lappa) sent him from Assam as the

fore, be either carried from the one extremity of the Himalayas to the other, passing from village to village and hand to hand over a wild mountainous country of perhaps several thousand miles, or be imported into the highland home of the savage Aka from the plains of India. But

that botanists have established the fact that, under Aconitum ferox and A. Napellus—the most poisonous species of Aconite—there are forms known to the shepherds of the higher Himalaya which, like Aconitum heterophyllum, may be eaten with impunity, or used as tonic or anti-periodic medicines The *Makhzan-el Adwiya* states that the only plant that can grow near the *Bikh* is the *Jadwar* This may be a mere tradition, but if it be accepted as carrying any meaning with it, all idea of the *Jadwar* being Zedoary would have to be completely set aside Dr. Moodeen Sheriff, indeed, urges that much unnecessary ambiguity has been caused through an early error of regarding the word Zedoary as derived from *jadwar* and *zadwar* The Sanskrit scholar, the late Mr. Colebrooke, identified *nirbisi*, *jadwar*, and *zadwar*, as synonymous terms, and suggested that these were most probably given to a species of Curcuma, but he added, if this be not so, they would have to be collectively assigned to the root of some other plant Ainslie contended that the *nirbishie* of Dr Hamilton "must not be confounded with the word *nirbisi*, which is the Sanskrit for Curcuma Zedoaria." Dr Dymock and many other modern writers, however, assign these classical names to Delphinium denudatum, not because of the roots of that plant agreeing with the descriptions given by early authors, or of their being used (at the present day) or known to possess the property of an antidote to poison, but because the hill tribes, on a restricted portion of the Himalaya, are stated to give it the local name of *Nirbisi* The writer suggested to Dr Gimlette, Residency Surgeon, Nepal, the desirability of his instituting certain enquiries into the subject of the Nepal Aconites As the result samples of a number of plants and roots, together with their vernacular names and notes as to uses, were communicated The *Kala bikh*

Kala bikh. 260

Dulingi of the Bhotias, who make a
hese roots), was reported to be a very
so poisonous, indeed, that the Kat-
it they possess any *Pahlo* (yellow)

Pahlo bikh. 261

bikh, a less poisonous form of the same plant, known to the Bhotias as

Setho bikh 262

Adulterants 263

DELPHINIUM denudatum.

The Nirbisi or Jadwar.

MEDICINE.
Nilo bikh.
264
Ratto bikh.
265

datum, the *Nilo* (blue) *bikh* of the Nepalese, and the *Nirbisi* of the Bhutias, **Dr. Gimlette** reported to be used by the *Dalis* of *Nepal* for the same purposes as the *Seto* and *Pahlo bikh*. **Geranium collinum** (var. **Donianum**) was found to be the *Rato* (red) *bikh* of the Nepalese, and the *Nirbisi num* of the Bhutias, and like the *Seto bikh* was stated to be given as a tonic in dyspepsia, fevers, and asthma. Lastly, a plant never before recorded as used medicinally, namely, **Caragana crassicaulis**, was sent to the writer under the name of *Artiras* of the Nepalese and the *Kerti* of the Bhutias; it was reported to afford a root employed as a febrifuge. The Nepalese name, *Artiras*, may be admitted as recalling *Atis* (**Aconitum heterophyllum**), and the Bhutia *Kerti*, as bringing to mind *kutki* (**Picrorhiza Kurroa**), two drugs which, like *Nirbisi* (or *Nirbishi*) and the *Seto* or *Pahlo bikh*, are employed as tonics and antiperiodics. (Conf. with **Coptis Teeta, Vol. II., No. 1792, p. 522.**)

Munila.
266

Delphinium denudatum inhabits the southern warmer slopes of the Himalaya, descending to lower levels than any of the aconites, though in its higher areas it becomes intermixed with **Aconitum heterophyllum**. Around Simla and extending into Kumaon and Kulu, it is known as *munila*, but it neither bears the name of *nirbisi*, nor has assigned to it any medicinal properties. It would not be difficult to suppose that if the original *nirbisi* or *nirvishi* (for the difference may after all be but the result of modern speculation) was obtained from the Himalaya, and was also known as the *zadwar*, it may have been some of the tonic and febrifugal roots already alluded to, if it be not, as **Moodeen Sheriff** thinks, the non-poisonous forms of aconite. This supposition would give meaning to Father Ange's statement (in the *Persian Pharmacopœia*, published 1681) that the root, though poisonous when fresh, was perfectly innocuous when dried, and that when mixed with food and condiments it acted as a restorative. The *nirbisi* of the plains of India—the rhizomes of **Kyllingia monocephala**—may have come to be so called from their resemblance to Zedoary, the *Jadwar* of some writers. In pursuing such an opinion one might be almost pardoned the speculation that in the earlier ages of medical knowledge, the strength-giving bitter roots would have been likely to attract attention and to obtain a high reputation long before the less evident, and more hypothetical remedies of modern times became known. Since these tonics abound in the higher temperate regions of Asia, they would likely enough have continued, with the migrations of the people southwards, to be carried all over the fever-stricken plains that possess but few good tonic and febrifugal drugs. The property of an antidote to poison, if ever assigned to these drugs, might fairly well have depended upon their tonic action in strengthening the system against the effect of poison. The literature of *Nirbisi* is not so complete as that of *Jadwar*, but accepting the usual assumption as correct that these are mere synonyms, the present review of this subject may be concluded with a reference to the writings of Muhammadan physicians on *Jadwar*. Under that drug **Mir Muhammad Husain** mentions *Anthia* as its Arabic name, and *Sitúrgús* as its Greek. **Dioscorides** refers to two forms of the aphrodisiacal drug *satyrion*, but both these are most probably the saleep tubers which, in consequence of the superstitious doctrine of signatures, have for ages enjoyed in Asiatic countries the reputation of being stimulants to the generative organs. Muhammadan writers allude to saleep under the name of *Khusyat-uth-thalab* (Foxes' testicles), and the odour of the fresh root is said to resemble that of semen. Saleep has in India the reputation of being a nervine restorative and aphrodisiac. Here then we have another link between the early *nirbisi* and the more recent Zedoary, which might serve to connect the rhizomes of the medicinal sedges **Kyllingia monocephala** and **Cyperus rotundus**. But

MEDICINE.

Mir Muhammad Husain mentions five kinds of *Jadwár*: the first and most valuable of all—the *Khatai*—is said to be black externally, purplish

aconites.

The writer does not venture to suggest what each of Mir Muhammad's

Delphinium saniculæfolium, *Boiss.; Fl. Br. Ind., I. 25.*

267

Habitat.—An erect herbaceous rigidly-branched plant, met with in the Western Himálayas, frequenting dry hills from the Indus to the Jhelum, omposed of many pale

HISTORY. 268

ks on Indian Economic and medicinal flowers

flowers of The Aitchison with the has no that species below.)

D. vestitum, *Wall.; Fl. Br. Ind., I., 25*

269

Vern.—*Juhi*, SIMLA.

Habitat.—West and Central Himálaya

12,000 fe

forests,

deeply l

flowers On the higher area where it is ... it is extremely abundant, miles of country being ... Achillea millefolium, Tanacetum ...

approaching the type of **D. Brunonianum** and **D. cashmirianum**. Has roundish leaves 5-9 lobed, and almost dentate instead of serrate. Flowers larger than those of the lower altitude, opening up more pronouncedly and pale blue coloured. This plant commences to appear where **D. denudatum** disappears, and ascends to the altitude where **D. cashmerianum** and **D. Brunonianum** occur.

MEDICINE.

Medicine.—On questioning hill people, who were found collecting **Jurinea macropcephala** (the roots of which are used as incense, under the name of *dhup*), and also the medicinal rhizomes of **Picrorhiza Kurrooa**, as to any uses of the roots of this **Delphinium**, the writer was informed that they were not collected, nor were they known to possess any medicinal virtues. The LEAVES were said, however, to be poisonous to goats. Neither the leaves nor *flowers* have the musk odour of **D. Brunonianum**. This negative information is alluded to here in consequence of the writer's conviction that authors who attribute medicinal properties to **D. denudatum** are most probably in error. If any **Delphinium** was a regular article of trade (medicinally) the present species might be expected to be so, far rather than the scarcer plant **D. denudatum**, which at most (though widely distributed at altitudes between 5,000 and 8,000 feet) occurs only here and there, and yields a small inert root.

Leaves. 270

271

Delphinium Zalil, *Aitch. et Hemsl., Botany of the Afghan Delimitation Commission, published in the Trans. Linn. Soc. (2nd series), Vol. III., 20, 30.*

Vern.—*Asbarg*, HIND.; *Asbarg* (the dye), and *ghafis* (the medicine), PB.; *Zalil*, KHORASAN; *Trayamán, gul-jalil*, BOMB.; *Asfrak, asperag, trayamán*, PERS.; *Zarir*, ARAB.

Habitat.—A perennial plant, throwing up a spike of bright yellow flowers two feet in height. **Dr. Aitchison** says of it: "This plant forms a great portion of the herbage of the rolling downs of the Badghis: in the vicinity of Gulran it was in great abundance, and when in blossom gave a wondrous golden hue to the pastures: in many localities in Khorasan, about 3,000 feet altitude, it is equally common." At another place he alludes to it again as with its showy blossoms covering the downs "which they illuminate with their brilliant colouring, affording a sight never to be forgotten."

DYE. 272

Dye.—The dried flowers and fragments of flowering stems are brought from Afghanistán to Multan and other Panjáb towns, from which they are conveyed all over India. In Multan, as in most other places, they are used along with *Akalbér* (**Datisca cannabina**) and alum, to dye silk a yellow colour. **Sir E. C. Buck**, in his *Dyes and Tans of the North-Western Provinces*, says of *Asbarg*: "A yellow dye extracted from the stalks and flowers of a species of **Delphinium**. "The flowers and stalks are imported into these provinces from Kabul and Khorasan *viá* the Panjáb. A decoction made from them is much used in silk dyeing, giving the sulphur yellow colour known as *gandhaki*. It is also used in calico-printing. Its price is R27-5 per cwt." This dye is also alluded to by **Mr. Liotard**, by **Dr. McCann**, and by **Mr. Wardle**, but under the name of **D. Ajacis**.

MEDICINE. Flowers. 273

Medicine.—The FLOWERS are bitter, and are said to be used medicinally as a febrifuge. **Dr. Dymock** publishes the following early account of the drug, being a translation from the *Makhzan-el-Adwiya*: "*Zarir* grows in the Khorján hills, and is called *Asfrak* by the people of Shiráj, and *Arjikan* by the Greeks; the stem is about a span high, flowers yellow, like those of *Asfar-i-barri*, surrounded by a few soft prickles, leaves yellowish, small, root more than a span long. *Asfrak* is cold and dry, with slight

heating spleen, which itch, t

MEDICINE.

use in itch is in he European plant) (Conf with the p 64)

DENDROCALAMUS, Reed, Gen Pl, III, 1212

Dendrocalamus Brandisii, Kurz, GRAMINEÆ — 274

Syn — For BAMBUSA BRANDISII, Munro See Vol I, p 391

D calostachyus, Kurz For Fl, II, 62 — 275

Habitat — Ava, at Bhamo, and on the Kakhyen hills east of it, at 3,500 feet elevation (Kurz)

D criticus, Kurz — 276

Habitat — Found in Pegu, altitude 3 000 feet, stems 15 to 30 feet Kurz says that it is apparently restricted to the shady side of the summit of the Kambalatoung, Prome Yomah

D giganteus, Munro — 277

Syn — BAMBUSUS GIGANTEA, Wall
Vern — Wakli waya BURM
References — Gamble Man Timb, 430 Mueller, Sel Extra Trop Pl (7th Ed), 132 Spons, Encyclop 921 Balfour, Cyclop, 914, Kew Off Guide to Bot Gardens and Arboretum 41

Habitat — Met with in Tenasserim, stems attaining a height of 100 feet and often 26 inches in girth

DOMESTIC Posts 278 Rafters 279

This is one of the largest (indeed next to Bambusa Brandisii the largest) of bamboos It is much used in Burma for POSTS and RAFTERS in rural house-building

D Griffithianus, Kurz For Fl Burm, II, 563 — 280

Syn — BAMBUSA GRIFFITHIANA, Munro
Habitat — Ava

D. Hamiltonii, Nees — 281

Vern — Kokwa BENG Tama NEPAL, Pao LEPCHA, Wah, MICHI, Wahnok, GARO Pa-shing BHOTIA

References — Brandis For Fl, 570 Gamble Man Timb 430 Hooker, Himálayan Journal I, 155 Indian Forester I 221 226; VII 49 VIII 293 XIII 522 XIV, 112 114; Mueller, Select Ext Trop Pl, 7th Ed, 132, Balfour Cyclop, 914

Habitat — A common bamboo in the Eastern Himalaya, from Kumaon to Assam Generally a tall grass 40 to 60 feet in height, but sometimes found as a long and tangled bush

FOOD. SHOOTS. 282

Food.—The young SHOOTS are boiled and eaten in Sikkim, Bhutan, and Assam.

TIMBER. 283

Structure of the Wood.—The halms are large, 3 to 6 inches diameter, rather hollow and not always straight, but they are used for every variety of purpose. The bamboo grows gregariously, on hill-sides, up to 3,000 feet, and the stems are 40 to 60 feet high. They frequently grow low and tangled, instead of straight; indeed, this bamboo may at times be recognised by this character and by the very thick shoots which grow out at the nodes (*Gamble*).

Mr. F. B. Manson, in an article in the *Indian Forester*, alludes to the utility of this bamboo to the tea planter in shading his estate from hot and violent winds. He then refers to the discussion as to its flowering. "I have noticed, he remarks, that the forest bamboo of the Terai is flowering pretty generally this year (1882); but the phenomenon does not universally affect all bamboos. I have also noticed clumps of this bamboo in a languishing condition which had lately flowered." Hooker, in his *Himálayan Journal*, says: "it flowers every year, which is not the case with all others of this genus; most of them flower profusely over large tracts of country once in a great many years and then die away."

284

Dendrocalamus Hookeri, *Munro.*

Vern.—*Ussey, assey, denga, ukotang,* ASS.

Reference.—*Brandis, For. Fl.,* 570.

Habitat.—An allied species to D. Hamiltonii, but with larger leaves (15 inches long and 3-4 inches broad), met with in the Eastern Himálayas, Assam, and the Khásia hills.

TIMBER. 285

Structure of the Wood.—Stems 50 feet in height, and like the other species put to many useful purposes.

286

D. longispathus, *Kurz, For. Fl. Burm., II.,* 561.

Vern.—*Wa-ya,* BURM.

Habitat.—Frequent along the *chongs* in the moister upper mixed forests, and also in the tropical forests of Arracan, Pegu, and Martaban (*Kurz*).

TIMBER. 287

Structure of the Wood.—Stems from 40 to 60 feet in height.

288

D. membranaceus, *Munro.*

Vern.—*Wa-yai,* BURM.

Habitat.—A native of Burma.

TIMBER. 289

Structure of the Wood.—Stems 40 to 50 feet.

290

D. Parishii, *Munro.*

Habitat.—Brandis remarks that this species is described from specimens said to have been collected in the Panjáb Himálaya. It is closely allied to D. Hamiltonii, differing in its ovate lanceolate acute spikelets.

291

D. serviceus, *Munro.*

Habitat.—Found on Parisnath, Chutia Nagpur.

292

D. strictus, *Nees.*

THE MALE BAMBOO.

Syn.—BAMBUSA STRICTA, *Roxb.*

Vern.—*Báns, bans kaban, bans khúrd, kopar,* HIND.; *Karail,* BENG.; *Mathan, saring, burumat,* KOL.; *Buru mat,* SANTAL; *Bukhar* (for the Clump), PALAMOW; *Halpa, veddar, vadur,* GOND; *Bhiru,* BAIGAS;

The Male Bamboo. (G Watt) DENDROCALAMUS strictus.

Bas, udha (*kaban, bassa* or *vassa*, Lisboa), BOMB ; *Bhovarlit*, MAR , *Kark*, PANDRATOLA , *Kanka, sadhanapu venduru* (Elliot), TEL , *Mytn wa*, BURM.

Habitat.—Met with throughout India, but most abundantly in the plains and lower hills of Northern and Central India, ascending to 3,000 feet. Kurz says it is a xeroclimatic species, common on the Continent of India, but does not go further south than Upper Tenasserim He describes it as a bushy plant, from 20 to 30 feet in height. Dr. King remarks that it is the only bamboo found on Mount Abu. It is scarce in Banda, but in the drier districts of Central and Southern India, it affects the cooler northerly and westerly slopes In Bengal and along the foot of the Himálaya where the climate is damp, it occurs chiefly on the warm southerly faces of the hills It has often deciduous leaves, and the stems, which frequently attain a height of 100 feet, are strong, elastic, and nearly solid

CULTIVATION

CULTIVATION. Flowering. 293

FLOWERING, &c.—This species is sometimes said to flower gregariously, but more frequently single clumps are found to do so Mr. Gamble publishes an account of its flowering along the base of the hills in the North-West Provinces Mr Greig (the Conservator) reported · "I have observed numbers with one or two stems of a clump in flower, in some places as many as 5 per ... others I have only fo... thousands examined. B... over large areas have ... thicket of young clumps of from 10 to 30 feet high. The seeding com- ... ever since." Whole ... ed and died in 1877- ... the flowering of this ... example of great vitality in certain bamboos, I may mention here that on the same road along which ... strictus ... flowere...

... block, ... s attack- ... , turned the corner of the Siwaliks at Hardwar, and fertility is now apparently

FLOWERING.

gradually spreading westward among the southern face of the Siwaliks. It remains to be seen whether this gradual march will continue along the rich bamboo forests of the eastern and central ranges of the Saharanpur division. Elsewhere I have seen this species flowering only sporadically." *The Seeding of Bamboos, by A. F. Brown, Esq., published in the Ind. For., Vol. XII., p. 413.*)

A long and interesting "Note" on the cultivation of this species in the Central Provinces will be found in the *Indian Forester.* But the following brief passages may be here republished:—"In every forest producing this species, a certain number of stems flower and seed annually, but a general seeding is only an occasional occurrence. Regarding the time or conditions of seeding, nothing definite is at present known, but it is evident that general seedings are associated with a short rainfall. In general seedings all clumps of the same age appear to seed within the two years over which the seeding generally seems to extend. It is the opinion of natives, and one which is believed in by many forest officers and others, that seeding is prevented or retarded by heavy working of the clumps; the opinion is doubtless to a certain extent correct, but it is improbable that cutting will have effect if deferred till the clumps begin to flower. It is not an uncommon thing to find small one-year old shoots from clumps entirely cut over, producing seed." "It has been observed that a poor and unfavourable soil is conducive to the production of seed." "Probably the real cause of seeding is exhaustion of the soil accessible to the roots of the clumps ,which is felt the more the dryer the season: a supposition further supported by the fact that seeding is more common on poor than on rich soils. Stems that flower casually yield hardly any fertile seed, and hardly any seed at all, whereas in the general seedings the yield is very large and of excellent quality, especially in the first year" (*Ind., Forester, IX., 531*).

Speaking of the shedding of the leaves, Mr. Kurz remarks that it "becomes often evergreen in damper climates, or when grown in moister localities." With reference to the flowering, he remarks that this occurs when the plant is between 25-30 years old. A man who has seen two flowerings is considered old. It is generally followed by the death of the clump, but "exceptional cases are known to me where a shoot was thrown up and grew and formed a new stock." He states that the seedlings grow from 1 to 1½ feet in height during the first year and not more than 4 feet up to the third. Brandis says "the stems attain their height in a few weeks at the commencement of the rains; in the Panjáb they do not harden fully during the first year." Stewart also remarks that according to the natives it accomplishes its growth in two or three weeks. Owing to the annual shedding of the leaves, there is always a large amount of dry foliage on the ground which makes forests of this bamboo liable to large and very destructive fires. The writer in the *Indian Forester* quoted above, regarding the cultivation of this species in the Central Provinces, remarks:—"It is probable that as a living plant this bamboo will come into use for the consolidation and support of embankments; the complete and endless network of rootlets which develop around every clump and extend from the surface to 9 or even 12 inches below, binds the whole surface soil into a solid mass which can be cut into blocks with a spade, but is not easily broken until the rootlets die or decay" (*Indian Forester, IX., 529*).

SOILS. 294

SOILS SUITABLE FOR D. strictus.—"Widely as the species is distributed it is not to be found in all localities nor on all soils. The slopes of hills, ravines, and the banks of *nalas* are the favourite localities. In the plains it occurs forming dense masses and covering large areas, but on sandy

CULTIVATION.

soils only A rich and free soil, good drainage and plenty of moisture, are favourable if not essential to its production, though as already stated, it is found forming dense masses in the sandy plains, in such places it only flourishes on the banks of *nalas* or where there is a good deposit of vegetable mould On a considerable area of poor sandy soil it abounds without attaining any size, and in such cases its existence can only be attributed to conditions being favourable to germination, and to the protection afforded to the young plants by tree vegetation

"In clay soils, and the combinations of clay and lime (*kankar*), not unfrequently met with, the species refuses to grow In the black cotton soils of the plains, and even in very wet soils, it will grow luxuriantly when once thoroughly established, but young plants soon succumb to excessive moisture

"Though not very productive, pure bamboo forests exist in several places in the Central Provinces, the species thrives best when associated

forest"

Reproduction. 295

REPRODUCTION —This is "secured by seed and by rhizomes with root lets and portions of the stems attached In the early stage of existence the rhizomes are larger in proportion to the stems and have greater vital

shoots at each node

only

yet tc

and

record

297

quickly as possible, six to eight inches of stem being placed below ground The first burst of the monsoon is the most favourable time for this operation, in the absence of rain the water-supply must be kept up artificially till foliage is developed, if the soil is good, further tending will be unnecessary, clumps thus raised on good free soil produce marketable shoots in five years

Seeds. 298

"In propagating by seed sowings
may be raised in nurseries and trans
experience is confined to the result of
dealt with was 50 acres situated on the [illegible] The soil was not good, though not extremely poor, but there was a little cover on the ground, the sowings were in prepared lines, but no manure of any kind was applied The seed was put down in July but sown too thickly, and at the end of the rains the plants averaged 18 inches, or four times the height of natural seedlings of the same age, but the plants were weak Had the soil been rich and the sowing less thick, or had the plants been properly thinned on appearance above ground, it is more than probable

DENDROCALAMUS strictus.

The Male Bamboo.

CULTIVATION.

that the growth would have been really vigorous." "*It is probable that excellent results may be obtained by sowing in pits three feet in diameter and one foot deep, filled with good rich mould, provided the plants are thinned when about four feet in height; not more than four plants should stand in each pit.*" "*If the seed is good more than 10 seers to the acre is not likely to be necessary.*" "As bamboos need not, as a rule, be planted nearer than 15 × 15 feet, an acre of nursery will suffice for planting about 80 acres."

Thinning or Cutting. 299

THINNING OF CLUMPS AND CUTTING FOR THE MARKET.—"As regards cutting for the market, it is obviously essential to preserve, in a vigorous condition, the rhizomes whose turn it is next to produce shoots; it has already been noted that, after clumps have produced full-sized shoots, reproduction is generally from rhizomes of two years old, though occasionally it proceeds from those of greater age. It is, therefore, obvious that to secure a maximum production no shoot should be cut until the end of the second rainy season succeeding that in which it was itself produced, unless increased production is rendering the forest too dense, a condition which cannot be said to exist as long as *there is ample space for the full development of* foliage on all standing stems, and clear space for the upward course of new shoots."

"The maintained production of shoots *must prevent general seedings*, which only succeed the cessation of the production of shoots. It is also probable that the complete removal of the older shoots will result in the decay of the rhizomes attached to them, and that thus the stems left will become independent of the old parent-root, and be less likely to seed than if their connection were maintained. As long, therefore, as the production of shoots does not annually increase, and there is no indication of the standing crop being too dense, all shoots should be preserved till the dry season following the second rains after that in which they were produced, when they should be cut and removed." The author of the interesting article on these bamboos from whom the above passages have been abstracted proceeds to state that, where a demand exists *for green stems*, a limited amount may be cut from each clump, but that, unless the reproduction be vigorous, they should not be cut off close to the ground but two feet above, "thus *leaving eyes for the development of branches and foliage to preserve the* vigour of the root."

Season of Cutting. 300

SEASON OF CUTTING AND PERIOD WHEN THE CLUMPS COME INTO BEARING.—"With the view to production, the best season for cutting is from the time the leaf begins to fade, up to the time the clumps become leafless." The period *before* a wild or cultivated forest may be expected to come into bearing has been variously stated. "The number of years necessary for the production of full-sized shoots is undetermined, but is known to vary greatly according to the conditions under which the plants have grown up. In natural forests there is reason to believe that full-sized shoots are not produced until the clumps are about twelve years old, but in really successful artificial plantations the time will probably be reduced to six years. **Sir D. Brandis**, in the passage *already quoted*, states that the shoots attain their full height in a few weeks, but in the Panjáb they do not harden during the first year. This of course refers to the formation of shoots on a clump in full bearing condition. **Dr. Schlich**, in his Forest Administration Report of the Central Provinces, says eight years may be taken as the time in which artificially-raised bamboos of this species will, under ordinary circumstances, come into bearing."

FIBRE. 301

Fibre.—The fibre from the stem is suitable for the manufacture of paper, but its high value prevents it from being so used. **Kurz** remarks that the natives of Behar "employ the *junglí bans* (**Dendrocalamus strictus**) for

making neatly-worked plates, hand-fans, &c., which are generally sold in the towns through the whole of India"

Medicine —The s... nost ... It ... ally ... are

MEDICINE Tabashir. 302

Leaves. 303

... The leaves are given to horses when suffering from cough and the lea... in" (H...

Food ... good fod... fodder for ... SEEDS are ... food may ... estimated by the fact that while wheat, the principal food-grain, sold at 12 seers for the rupee, bamboo seed sold at from 40 to 50 seers" (*Indian Forester, IX, 529*)

FOOD AND FODDER. Leaves. 304

Seeds. 305

Structure of the Wood —This is the male bamb... name given to it beca...

TIMBER. 306

Spear Handles. 307

... fts, walking sticks, whip ... handles, stakes to suppo... sugar-cane, on light soils, stakes for *pán* plants and for construction of *jaffries* for *pan* gardens, for the construction of strong fencings to resist wild animals, the manufacture of small mats used like slates in roofing, mats for floors, covers of carts and various other purposes, sieves, hand punkahs umbrellas ... vessels for holding ... bows, arrows, and co... articles It is also ... when converted into ... Dry stems are also u... (*Indian Forester, IX, 529*)

Rafters. 308

Battens 309

Walking Sticks. 310

Stakes 311

Torches, &c 312

Trade in Male Bamboos —Very little can be learned of the trade in this most valuable article The reports that exist deal ... and for different season... not be drawn up The ... are green (*e.g*, young) or

TRADE. 313

TRADE.

and markets the higher value generally attaches to green bamboos, being sometimes as much as twice that of dry bamboos. As regards seasoning the preference is in some places given to bamboos that have been soaked in water for a length of time, while in others bamboos thus seasoned will not command a market. The chief use of water-seasoning appears to be the destruction of the insects which attack the bamboo when cut out of *season.*" "*Bamboos cut in the rains are always liable to speedy decay.*"

Hyderabad. 314

Particulars were called for (in connection with the preparation of the present article) as to the trade in this bamboo, its price and other such information. The reports received from the various provinces of India may be here summarised. Of Hyderabad (Berar) **D. strictus** is stated to occur chiefly in the hills of the Gawilgarh Range. It is said also to be common in Melghat—plentiful in the reserves, though disappearing from the forests. The total exports during the past ten years are reported to have been valued at R2,54,885, or a mean annual value of about R25,000. The local price is returned as R1-8 per hundred.

Coorg. 315

Of Coorg it has been reported:—"Chiefly used in roofing, fencing, baskets, &c.; annual sales from Government forests in Coorg 2 lakhs; price in the forest R1 to R1-8 per hundred. Probably 8 or 10 lakhs could be cut yearly from the Coorg forests without diminishing the supply. From a forest point of view it is desirable to diminish the number to a large extent and allow timber to take the place of the bamboo. If it were not for the periodic seeding and dying off of the bamboos they would gradually cover the whole forest to the exclusion of tree growth, as tree plants seldom get up where bamboos are thick. The seeding of the **D. strictus** usually takes place by clumps. Every year scattered clumps seed."

Madras. 316

Two reports from Madras may be here given:—Of the Northern Circle it has been said—"This is the 'male bamboo.' Universally found on the drier slopes of hills, and occasionally in ravines, where, as in the Nilghiris, it often attains a large size, even 3-4 inches in diameter. It is in general use for all the purposes for which bamboo is required. The annual production cannot well be given, as the supply is so much greater than the demand, but the amount exported from the Government Forests is very considerable (*See Annual Report*)." Of the Southern Circle **D. strictus** is reported to be "common in dry forests up to 3,000 feet. It is universally used for building purposes and is in demand for spear shafts and the like. It is impossible at present to say what the annual production and amount available may be. The Government seigniorage is R1-4 per cart-load of half a ton, the collection and transport of which costs the purchasers from R4 to R5 and fetches from R6 to R9.

Ajmere. 317

The Conservator of Ajmere-Merwara writes that **D. strictus** is scarce in his district, selling for R10 per hundred. **Mr. McGregor** (Conservator of Forests, Southern Division, Bombay) reports that this bamboo occurs chiefly in the drier forests, but is very local. "The rate charged is one rupee per 100 stems." **Mr. A. T. Shuttleworth** (Conservator, Northern Division) remarks that it is very abundant in the forests, but is disappearing in parts owing to its being overworked. "It is used largely in connection with betel vine cultivation in the Thana District as props or supports." From the North-West Provinces several communications have been received. Of the Dehra Dún Division it is said to be the chief wild bamboo. "It is found in large quantities only at the eastern end of the district near and on the Siwaliks. With regard to the market, this bamboo is classified into six kinds. These are as follows:—

Bombay. 318

N.-W. Provinces. 319

"(1) *Sarándha.*—A hollow bamboo 6″ to 9″ girth, 12′ long. Used for chicks, baskets, shouldari poles, &c. Annual export from

TRADE

Dehra Dun Division into or through Hardwár about 700 scores, at 5 annas per score

"(2) *Rakmi or Chanyu* —Hollow or solid bamboos up to 6" girth and 10' long Mainly used for thatching Annual export as above 28,000 scores at 2½ annas per score

"(3) *Lathi* —The hollow or solid lower thick end of the bamboo used for sticks Annual export as above about 35,000 scores at 2 annas per score Chiefly sold to pilgrims in Hardwár

"(4) *Kain* —The 'branches' of the bamboo used for fences and in thatching small houses About 100 headloads are exported annually

"(5) *Poochli* —The upper portion of the bamboo, above the *Sardncha*, used for thatching purposes about 9 long Annual export about 5 000 scores at 1 anna per score

"(6) *Dry bamboos* —Ten feet long are used for thatching About 11 000 scores annually exported at 1½ annas a score"

Of the Saharanpur Division it has been reported that "in Hindustani Dendrocalamus strictus is called *Mooger*, its girth is from 8" to 9", and height 70 to 80' It germinates in March and August being the Hindi

November in the year. It is used for four purposes, *viz*, the topmost portion for fishing rods, the second portion for lance staves, the third for making *charhao* or *phar* of carts, and the fourth for making baskets, &c It is sold at R40 per score, and is available in Garhwal and Rampur"

Fishing Rods. 320

Lance Staves. 321

Bengal. 322

Of Bengal (Chhutia Nagpur Division) the Deputy Conservator of Forests reports "Found in the Singbhoom District Wood used for building, fencing, baskets, mats, walking sticks, spear shafts, axe handles, &c, also building houses It is plentiful, and is sold at 4 to 8 annas per 100 in the forests"

"The male bamboo is also found in the Hazaribagh forests and in the Angul forests of Orissa Specimens have been sent from both forests to the military authorities at Calcutta, from the former for lance staves and from the latter for army signalling Canes were, however, pronounced

Central Provinces. 323

Dendrocalamus strictus, *Nees*, called the "male bamboo?" He presumes this is because of its reputation of having a solid stem, but he adds "I have *never myself seen* a stem *entirely* solid, though I have no doubt there are such I have seen many with a very small cavity, and many

from the Moharli Forests of the Chanda Division, but *there* they were only found in one particular tract, on Vindhyan sandstone, which had been preserved from fire for some years previously. Boput told me at the time that the only other place where he could procure sufficiently solid stems was a certain forest in the Chindwara District, the name of

The Male Bamboo.

TRADE.

and markets the higher value generally attaches to green bamboos, being sometimes as much as twice that of dry bamboos. As regards seasoning the preference is in some places given to bamboos that have been soaked in water for a length of time, while in others bamboos thus seasoned will not command a market. The chief use of water-seasoning appears to be the destruction of the insects which attack the bamboo when cut out of season." "Bamboos cut in the rains are always liable to speedy decay."

Hyderabad. 314

Particulars were called for (in connection with the preparation of the present article) as to the trade in this bamboo, its price and other such information. The reports received from the various provinces of India may be here summarised. Of Hyderabad (Berar) **D. strictus** is stated to occur chiefly in the hills of the Gawilgarh Range. It is said also to be common in Melghat—plentiful in the reserves, though disappearing from the forests. The total exports during the past ten years are reported to have been valued at R2,54,885, or a mean annual value of about R25,000. The local price is returned as R1-8 per hundred.

Coorg. 315

Of Coorg it has been reported:—"Chiefly used in roofing, fencing, baskets, &c.; annual sales from Government forests in Coorg 2 lakhs; price in the forest R1 to R1-8 per hundred. Probably 8 or 10 lakhs could be cut yearly from the Coorg forests without diminishing the supply. From a forest point of view it is desirable to diminish the number to a large extent and allow timber to take the place of the bamboo. If it were not for the periodic seeding and dying off of the bamboos they would gradually cover the whole forest to the exclusion of tree growth, as tree plants seldom get up where bamboos are thick. The seeding of the **D. strictus** usually takes place by clumps. Every year scattered clumps seed."

Madras. 316

Two reports from Madras may be here given:—Of the Northern Circle it has been said—"This is the 'male bamboo.' Universally found on the drier slopes of hills, and occasionally in ravines, where, as in the Nilghiris, it often attains a large size, even 3-4 inches in diameter. It is in general use for all the purposes for which bamboo is required. The annual production cannot well be given, as the supply is so much greater than the demand, but the amount exported from the Government Forests is very considerable (*See Annual Report*)." Of the Southern Circle **D. strictus** is reported to be "common in dry forests up to 3,000 feet. It is universally used for building purposes and is in demand for spear shafts and the like. It is impossible at present to say what the annual production and amount available may be. The Government seigniorage is R1-4 per cart-load of half a ton, the collection and transport of which costs the purchasers from R4 to R5 and fetches from R6 to R9.

Ajmere. 317

The Conservator of Ajmere-Merwara writes that **D. strictus** is scarce in his district, selling for R10 per hundred. Mr. **McGregor** (Conservator of Forests, Southern Division, Bombay) reports that this bamboo occurs chiefly in the drier forests, but is very local. "The rate charged is one rupee per 100 stems." Mr. **A. T. Shuttleworth** (Conservator, Northern Division) remarks that it is very abundant in the forests, but is disappearing in parts owing to its being overworked. "It is used largely in connection with betel vine cultivation in the Thana District as props or supports." From the North-West Provinces several communications have been received. Of the Dehra Dún Division it is said to be the chief wild bamboo. "It is found in large quantities only at the eastern end of the district near and on the Siwaliks. With regard to the market, this bamboo is classified into six kinds. These are as follows:—

Bombay. 318

N.-W. Provinces. 319

"(1) *Saráncha.*—A hollow bamboo 6" to 9" girth, 12' long. Used for chicks, baskets, shouldari poles, &c. Annual export from

TRADE.

Dehra Dún Division into or through Hardwár about 700 scores, at 5 annas per score

"(2) *Rakmi or Chanyu* —Hollow or solid bamboos up to 6" girth and 10' long Mainly used for thatching Annual export as

" ... oo used ... res at 2

"(4) *Kain* —The 'branches' of the bamboo used for fences and in thatching small houses. About 100 headloads are exported annually.

"(5) *Poochli* —The upper portion of the bamboo, above the *Sarańcha*, used for thatching purposes about 9' long. Annual export about 5,000 scores at 1 anna per score

"(6) *Dry bamboos* —Ten feet long are used for thatching About 11,000 scores annually exported at 1½ annas a score"

November in the year. It is used for four purposes, *viz*, the topmost portion for fishing rods, the second portion for lance staves, the third for making *charhao* or *phar* of carts, and the fourth for making baskets, &c. It is sold at R40 per score, and is available in Garhwál and Rampur"

Fishing Rods. 320

Lance Staves. 321

Of Bengal (Chhutia Nagpur Division) the Deputy Conservator of Forests reports: "Found in the Singhboom District Wood used for ... ifts, axe handles, ... to 8 annas per

Bengal. 322

... he male bamboo is also found in the Hazaribagh forests and in the Angul forests of Or... from both forests ... er for lance staves ... wever, pronounced ... annual production at Koderma is two to four in each clump Price 12 annas per hundred;

Central Provinces. 323

... many with a very small cavity, and many more with a large cavity. The Members of the Nagpur Hunt Club in my time were wont to use as spear shafts *almost solid* stems of D. strictus, as solid as they could get them, and I remember, in 1877, supplying the local but celebrated spear-maker, Boput of Nagpur, with about one hundred shafts of the almost solid stems of this bamboo, they came from the Moharli Forests of the Chanda Division, but *there* they were only found in one particular tract, on Vindhyan sandstone, which had been preserved from fire for some years previously. Boput told me at the time that the only other place where he could procure sufficiently solid stems was a certain forest in the Chindwara District, the name of

Spear Shafts. 324

The Male Bamboo.

TRADE.

which I forget. This tends to show that the solid, or almost solid, stem of this bamboo is not common, at least near Nagpur.

"It is this kind of stem, used for spear-shafts, which I have always understood to be the male bamboo. How is it therefore that the name of male bamboo is applied to the entire species?"

The Editor of the *Forester* in a foot-note to the above passages suggests that **Boput** might try the solid bamboos procurable in Chhutia Nagpur (Palamow or Koderma).

Solid Bamboos. 325

The writer had numerous applications while on duty at London (in connection with the Colonial and Indian Exhibition) as to the best course to be pursued in the effort to establish an agency to supply English manufactures with solid bamboos. One dealer was desirous of procuring a regular supply suitable for lance shafts, another maker wished to obtain bamboo suitable for splitting up and afterwards consolidating the strips in the construction of fishing rods. The writer was unable to furnish the desired information, but is in hopes that the present general compilation from all available sources of information may suggest the most likely localities from which supplies might be drawn. From the above quotations, mainly from the *Indian Forester*, it would seem pretty certain that **D. strictus** in any or every locality will not do. It is necessary to select a particular area where the bamboo is known to produce stems of the required degree of solidity. This fact suggests an enquiry that would seem worthy of the attention of persons who may have the opportunity of following it out, *viz.*, as to the peculiar climate, soil, and exposure that is found to produce the more soild condition of stem. Possibly it may be found that, although belonging to the species **D. strictus**, there is a recognisable variety that possesses the desired property. From some such enquiry results of great value might be expected, such as the propagation under the required climatic condition or on the necessary soil, or if climate and soil be found of minor consideration, a wider distribution of the superior stock might be encouraged so as to establish plantations of solid bamboos 'n accessible regions.

Dendrocalamus Tulda, *Nees*, see **Bambusa Tulda,** *Roxb.*

Deodar. See **Cedrus Deodara,** *Loudon* (now recognised by **Sir J. D. Hooker** as **C. Libani,** *Barrel*, var. **Deodara,** *Hook.*); CONIFERÆ—see *Vol. II., No. 846, p. 235 of this work.*

DERRIS, *Lour.; Gen. Pl., I., 549.*

A genus of arborescent climbers or trees, embracing some 40 species, abundant in India, but according to the *Flora of British India*, found "belting the world in the tropics." **Thwaites** remarks that in Ceylon the barks of the species there met with are used by the Singalese for making ropes. Very little of an economic nature has been recorded regarding the Indian species, and only one or two need therefore be here mentioned.

326

Derris elliptica, *Bth.; Fl. Br. Ind., II., 243;* LEGUMINOSÆ.

Syn.—PONGAMIA ELLIPTICA, *Wall.; Wight, Ic., t. 420.*

Vern.—*Tubah*, MALAY PENINSULA.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 539; Kurz, For. Fl. Burm., I., 340; Christy, Com. Pl. and Drugs, No. 10, 1887, 39; Kew Reports, 1887, p. 43.*

Habitat.—A large, handsome climber, met with in Martaban, Burma, Penang, Malacca, and Siam, &c.

POISON. Roots. 327

Poison.—According to the Kew Report of 1877, the ROOTS of this plant, steeped in water, afford a useful insecticide for gardening purposes.

It is also used to kill fish No Indian author appears to allude to this fact The Malays use the bark as one of the ingredients in their Ipoh arrow-poison

Derris robusta, *Bth , Fl Br Ind , II , 241* — 328

Syn —DALBERGIA KROWEE, *Roxb , Ed C B C , 535* , BRACHYPTERUM ROBUSTUM, *Dalz & Gibs , Bomb Fl , 77* , DALBERGIA ROBUSTA, *Roxb , Hort Beng , 53*

Vern —*Mowhitta*, ASSAM , *Bolkakaru*, GARO , *Krowee*, SYLHET ; *Gum bong*, MAGH , *Buro*, KUMAON

References —*Brandis, For Fl 154, Kurz, For Fl Burm , I 330, Gamble, Man Timb , 133 Atkinson, Him Dist , 344 Indian Forester, XIV , 298 , Balfour, Cyclop , I , 879*

Habitat —A deciduous tree (30 to 40 feet in height) of the outer Himálaya, from the Ganges eastward, to Assam, Eastern Bengal, and down to Pegu

Structure of the Wood —Light brown, hard It may be used for tea- — TIMBER. 329.

D scandens, *Benth , Fl Br Ind , II , 240 , Wight Ic , t 275.* — 330

Syn —D TIMORIENSIS *DC* ; PONGAMIA CORIACEA, *Grah* , BRACHYPTERUM SCANDENS, *Dalz & Gibs , Bomb Fl , 76*

Vern —*Noalata*, BENG , *Golari, potra, nalavail* GOND , *Gunj*, PB , *Cheratali badu* (or *chiratala bóti*), *nala tige, motta sirli*, TEL , *Tupail*,

Hal
layas
Siam

Fibre —The bark affords a coarse rope fibre — FIBRE 331

Desmanthus cinereus, *Willd* (alluded to by *Ainslie in Mat Med , II , 458*), is now known as Dichrostachys cinerea, *W & A* , which see

D. nutans, *Willd* (*Roxb , Fl Ind , Ed C B C , 420*), see Neptunia olerace*our*

DESMODIUM, *Desv ; Gen Pl , Vol I , 519, 1002*

the genus

Desmodium Cephalotes, *Wall , Wight, Ic ii 209 and 373, Fl Br Ind , Vol II , 161 ;* LEGUMINOSÆ — 332

Syn —HEDYSARUM CEPHALOTES and UMBELLATUM, *Roxb (Fl Ind , iii , 360)* , DESMODIUM CONGESTUM, *Wall*

Vern —*Bir jhawar*, SANTAL , *Bodle kurú*, NEPAL , *Maniphtyol*, LEPCHA , *Chetenta*, TEL

References —
Beddome
Bomb Fl
Nagpur, N

The Desmodium Fibres.

Habitat.—A shrub of the Eastern Himálaya, Central Bengal, Western Gháts, South India, and Burma, ascending to 3,000 feet.

FOOD and FODDER. 333

Food.—According to the Rev. Mr. Campbell, the Santals eat the fruit of this plant. He also says cattle and goats eat the leaves.

TIMBER. 334

Structure of the Wood.—Yellowish, in structure resembling **D. tiliæfolium.**

335

Desmodium diffusum, *DC.; Fl. Br. Ind., II., 169.*

Habitat.—A herbaceous plant, one to two feet in height, found in the plains of the Western Peninsula, Bengal, Orissa, Bundelkhand, and Burma.

MEDICINE. 336

Medicine. Sir Walter Elliot (*Fl. Andh., 16, 36*) enters into a discussion as to the plant meant by the Telegu name *Cheppu tatta*, the *Antintulu* of some writers. In his experience these names denote **Desmodium diffusum**, but Beddome found the former given to **Coldenia procumbens**, and Ainslie assigns it (*Mat. Med., I., 23*) to **Asarum europœum**. It seems desirable to prevent confusion between these two plants, especially as the latter is a drug of some importance (*Conf.* with **Asarum, Vol. I., No. 1545, page 337**).

FODDER. 337

Fodder.—Roxburgh says the foliage of this species is eaten by cattle.

338

D. floribundum, *G. Don.; Fl. Br. Ind., II., 167.*

References.—*Kurz, For. Fl. Burm., 387; Atkinson, Him. Dist., 342, 456.*

Habitat.—A shrub met with throughout the Himálaya, up to 5,000 feet, also in the Khásia Hills. In Sikkim it is common in old cultivated lands at 3,000 to 5,000 feet.

339

D. gangeticum, *DC.; Wight, Ic. t. 271 & 272, now 270; Fl. Br. Ind., [II., 168.*

Syn.—HEDYSARUM GANGETICUM, *Willd; Roxb., Fl Ind., Ed., C.B.C., 575.*

Vern.—*Sarivan, salpan, salún*, HIND.; *Salpáni*, BENG.; *Tandi bhedi janetet'*, SANTAL; *Pústbœni*, N.-W. P.; *Shál purni ?* (Bazar name for the leaves), PB.; *Salparni, sálwan, dáye*, BOMB.; *Gita naram, koláku ponna*, TEL.; *Sála parni*, SANS.

References.—*Voigt, Hort. Sub. Cal., 221; Stewart, Pb. Pl., 67; Sir W. Elliot, Fl. Andh., 60, 92; Campbell, List of Econ. Pl., Chutia Nagpur, No. 9275; U. C. Dutt, Mat. Med. Hind., 145, 316; Dymock, Mat. Med., W. Ind., 2nd Ed., 222; Irvine, Mat. Med., Patna, 100; Atkinson, Him. Dist., 342, 456; Botanical Tour to Hazara by Stewart (Journ. Agri. Hort. Soc. Ind., XIV., 43); Indian Forester, VIII., 101, 407-8, 417; XII; App. II.; Gazetteer of Bundelkhand, 80; Gazetteer, Kanara, 432.*

Habitat.—A common species on the lower hills and plains throughout India. On the Himálayas it ascends to 5,000 feet and is distributed east to Pegu and Ceylon.

MEDICINE. 340

Medicine.—This shrub is regarded as a febrifuge and anti-catarrhal; it is one of the chief ingredients of the Hindu preparation *dasamula koatha* so frequently alluded to in Sanskrit works. The reader is referred to *U. C. Dutt's Mat. Med. of the Hindus, p. 145*, for a full account of the preparation, or to *Dymock's Mat. Med. West. India*, where that article is reproduced.

SPECIAL OPINION.—§ "Is one of the ten roots (*Dasha mula*) of the Hindu Materia Medica" (*Assistant Surgeon Sakharam Arjun Ravat, L. M., Gorgaum, Bombay*).

341

Desmodium latifolium, *DC.; Fl. Br. Ind., II., 168; Wall., Cat., 5692; Wight, Ic., t. 270.*

Vern.—*Sim matha sura*, SANTAL; *Gúba*, TEL.; *Kinbun*, BURM.

References —*Voigt, Hort Sub Cal, 221 Kurz, For Fl Burm, 385, Sir W Elliot, Fl Andhr, 55 Atkinson, Him Dist, 342, 456*

Habitat —An erect undershrub (3-6 feet high) found on the Eastern Himálaya to Burma, Siam, and Ceylon

Fibre —It affords a strong paper fibre

FIBRE. 342

Desmodium parvilolium, *DC ; Fl Br. Ind, II, 174* — 343

Vern —*Tandi chatom arak', tandi sunsuni,* SANTAL, *Khet sunsuni,* HIND (in Chutia Nagpur)

Habitat —A small densely cæspitose and much-branched plant, common everywhere on the plains of India, and from the Himálaya to Ceylon, as-

this plant as a green n by cattle, camels, and

FOOD AND FODDER 344

[*II, 171*

D. polycarpum, *DC, Wight, Ic, t 406 (non-Wall), Fl. Br Ind* — 345

Sy

Vern —*Bæphol,* SANTAL

References —*Dals & Gibs, Bomb Fl, 66 Roxb, Fl Ind, Ed C B C, 578, 579; Rev A Campbell, Econ Prod Chutia Nagpur, No 7833*

Habitat —An erect or sub-erect undershrub found throughout the Himalaya and everywhere in Burma distributed to Malacca, Ceylon, Zanzibar, Philippines, China, Japan, and Polynesia

Medicine —The Santals are said to use a preparation of the plant in fainting and convulsions

MEDICINE. 346

D. pulchellum, *Benth ; Fl Br Ind, II, 162* — 347

Syn —HEDYSARUM PULCHELLUM, *Roxb*, DICERMA PULCHELLUM, *DC Wight, Ic, t 418*

D. tiliæfolium, *G Don, Fl Br Ind, Vol II, 168; Wall, Cat, 5707* — 348

Syn —DESMODIUM NUTANS, *Wall* D ARGENTEUM *Wall* ; HEDYSARUM TILIÆFOLIUM *Don*

V

names are given by Stewart as Panjábi names), *Laber,* SIMLA, *Kalanchi,* MURRI

with in Tavoy

Fibre —The BARK yields an excellent FIBRE, extensively employed for rope-making, and in many parts of the Himalaya is used also in paper manufacture Mr Atkinson remarks that a trade is done in exporting this paper material to Tibet from Kumaon Stewart, in his account of Hazara,

FIBRE. Bark. 349 Paper. 350

FIBRE.

reports having found it being utilised for paper and textiles. In the *Kangra Gazetteer* (*p. 30*) it is stated that "the bark is used for paper-making in the jail at Dharmsála." The twigs are employed for tying loads; Stewart remarks of the form known as argenteum that the ropes made in Kanáwar were not lasting, but when fresh are very strong, and when platted as thick as the wrist, were found to stand under a heavy temporary strain when English ropes snapped.

MEDICINE. Roots. 351

Medicine.—The ROOTS are considered carminative, tonic, and diuretic; they are used in bilious complaints (*Dr. Emerson*).

FODDER. 352

Fodder.—The leaves afford a useful fodder (*Simla Settlement Report*).

TIMBER. 353

Structure of the Wood.—Yellowish-brown, with a darker centre.

354

Desmodium triflorum, *DC.*; *Fl. Br. Ind., II., 173*; *Wall., Cat.*, [*5734*; *Wight, Ic., t. 292.*

Syn.—D. HETEROPHYLLUM, *Wall.*; HEDYSARUM TRIFLORUM, *Linn.*; H. STIPULACEUM, *Burm.*

Vern.—*Kodalia*, BENG.; *Kudaliya*, N.-W. P.; *Jangli* or *ran-methi*, BOMB.; *Munta mandu*, TEL.

References.—*Roxb., Fl. Ind., Ed. C.B.,C. 577*; *Voigt, Hort. Sub. Cal., 223*; *Thwaites, En. Ceylon Pl., 86*; *Mueller, Select Extra-trop. Pl., 7th Ed., 132*; *Sir W. Elliot, Fl. And., 120*; *S. Arjun, Bomb. Drugs, 197*; *Atkinson, Him. Dist., 342, 458, and 735*; *Royle, Ill. Him. Bot., 194*; *Balfour, Cyclop., 927*; *Kanara Gazetteer, 432*; *Mysore and Coorg Gaz., I., 60.*

Habitat.—A small, much branched, slender, trailing plant; found everywhere in the plains throughout India, ascending to 4,000 feet in Kumaon, and 6,000 to 7,000 feet in Kashmír and on the Chenáb.

MEDICINE. Leaves. 355

Medicine.—The fresh LEAVES are applied to wounds and abscesses that do not heal well (*Wight*). Thwaites remarks that in Ceylon it is valued as a medicine in the cure of dysentery.

FODDER. 356

Fodder.—Roxburgh says this is "very common on pasture ground, and helps to form the most beautiful turf we have in India;" further, that "cattle are very fond of it." Müeller, in his *Select Extra-tropical Plants*, recommends its cultivation in regions too hot for clover. Col. Drury informs us that it springs up on all soils and situations, supplying there the place of Trifolium and Medicago.

357

Detergents and Soap Substitutes.

Medically the word "Detergent" would be given to any substance which had the power of cleansing wounds, ulcers, &c. While the lists of detergents given below embrace the better known substances of that nature they have been made to include also materials employed in place of soap, either from cheapness or because of reputed special properties. A complete list of the herbs used by the natives of India as detergent poultices, or even of those employed to cleanse the hair, would indeed be voluminous. The present account of detergent materials must therefore be viewed more as suggesting the position of such articles than as an exhaustive account of them.

Perhaps the most important of the soap substitutes are the species of Sapindus, the fruits of which are extensively employed to purify fabrics before being dyed. It seems probable that some of these detergents exercise a chemical influence not possessed by soap. At all events, it is often contended that certain peculiar results in dyeing can be obtained only when the fabric has been first washed with certain detergent vegetable substances, and that the same result cannot be brought about if soap be used. Speaking of the fruits of Sapindus Mukorossi, *Gærtn.* (= S. detergens, *Roxb.*), and of S. trifoliatus, *Linn.* (=S. emarginatus, *Vahl.* & S. laurifolia,

Vahl), Brandis says "The pulp makes a lather with water and is used extensively for washing, either by itself, or mixed with soap For flannel and Kashmir shawls it is greatly preferred to soap, and some varieties are specially esteemed for washing silk" Brandis adds that the subject of these detergent nuts would "repay further study" It seems highly probable that the natives of India recognise special forms, as having definite properties, under each of the species formed by modern botanists In the literature of the subject considerable confusion exists Dymock

other or not, does not seem to have been investigated, and both trees are met with under cultivation throughout the greater part of India Gamble makes practically the same remark under both species, viz, that the chief value of these trees lies in their saponaceous berries, which are largely used and exported as soap substitutes Mr Baden Powell remarks "For finer washing and dyeing purposes, the skin or shell surrounding the seeds of the soap nut tree is often used When mixed up with warm

Saponine Several species have in their bark and roots saponaceous properties" Dr J F Royle points out that the exact nature of the principle

operties
r wheat
but that
naceous
Caryo-
wn to be

river banks. Some of the clays met with locally possess so high a reputation as to constitute regular articles of trade, for example, the *Multáni-matt* of the bazars of India or the Fuller's-earth of European commerce.

HAIR-WASHES, &c. 358

I.—HAIR-WASHES AND DETERGENTS EMPLOYED TO REMOVE VERMIN.

The following enumeration exhibits some of the chief articles used by the people of India as hair-washes. With some of these it may be a matter of question whether they are resorted to as simple detergents, as insecticides, or as perfumes :—

Acacia concinna, *DC.* The pods.
A. Intsia, *Willd.* The bark, used in Sikkim.
Ajuga bracteosa, *Wall.* Employed to kill lice.
Albizzia amara, *Boivin.* Leaves used in South India.
Allium sativum, *Linn.* Applied along with vinegar to prevent the hair turning grey.
Andropogon Schœnanthus, *Linn.* Used to promote the growth of hair.
Anona squamosa, *Linn.* Powdered seeds along with gram used as a hair-wash.
Bassia latifolia, *Willd.* Oil-cake used as hair-wash.
B. longifolia, *Linn.* Regular trade done in the oil-cake as a hair-wash.
Begonia Rex, *Putzeys.* The juice: also employed to kill leeches.
Clay (see remark above ; also Vol. II., 361).
Cuscuta reflexa, *Roxb.* The seeds.
Cyperus scariosus, *R. Br.* The rhizomes.
Daphne oleoides, *Schreb.* The bark, used in Kanáwar.
Entada scandens, *Benth.* The seeds, used in Nepál.
Haloxylon multiflorum, *Bunge.* The stems and leaves.
Indigofera aspalathoides, *Vahl.* The ashes, used as a wash to remove dandriff.
I. tinctoria, *Linn.* A strong infusion of the root said to destroy vermin.
Lawsonia alba, *Linn.* Hair dye.
Malva parviflora, *Linn.* The root.
Melia Azadirachta, *Linn.* The seeds.
Nardostachys Jatamansi, *DC.* Said to promote the growth of hair.
Peganum Harmala, *Linn.* The root, applied to kill lice.
Phyllanthus Emblica, *Linn.* Fruits largely employed.
Picrasma quassioides, *Benn.* The bark, an insecticide.
Pithecolobium bigeminum, *Benth.* A decoction of the leaves is employed to promote the growth of hair.
Prunus Armeniaca, *Linn.* The kernels (? or the oil expressed from them), used in the Panjáb as a hair-wash.
Quercus incana, *Roxb.* The galls.
Sapindus Mukorossi, *Gærtn.* and **S. trifoliatus**, *Linn.* The fruits.
Saussurea Lappa, *Clarke.* The root largely used as a hair-wash.
Sesamum indicum, *Linn.* A decoction made from the leaves and root is employed as a hair-wash and is supposed to blacken the hair.

NOTE.—Medicinal insecticides will be found in list III.

SOAP SUBSTITUTES. 359

II.—SOAP SUBSTITUTES.

The list of substances used directly as detergents in cleansing fabrics or as soap substitutes in personal ablution is less extensive than those employed for washing the hair. The following may be specially mentioned :

A. arabica, *Willd.* Decoction of the bark (used in Bengal, Sind, &c).

SOAP SUBSTITUTES

Acacia concinna, *DC* The pods
A Intsia, *Willd* The bark
Adansonia digitata, *Linn* The ashes of the fruit and bark mixed with oil The fruit is used in Africa as a soap substitute.
Agave americana, *Linn* The juice
Avicennia tomentosa, *Roxb* Ashes of wood employed in Madras to wash cotton cloths
Balanites Roxburghii, *Planch* The pulp of the fruit for silk
Carica Papaya, *Linn* Leaves used by the Negros to wash linen
Casuarina equisetifolia, *Forst* Ash

la,

he

newly married'
Limonia acidissima, *Linn* Pulp employed in Java as a soap substitute
Lychnis indica, *Benth* Roots and leaves used as soap in Lahoul
Malva parviflora, *Linn* The root is employed in Kanawar to cleanse woollen cloth
Phaseolus Mungo, *Linn* Flour used in place of soap
Sapindus Mukorossi, *Gærtn* & S trifoliatus, *Linn* The fruits extensively

ndis and

ıock

S
S

NOTE —The above list of Detergents does not of course include the

soap along with certain vegetable oils See also under SOAP.

III —MEDICINAL DETERGENTS

MEDICINAL DETERGENTS. 360

OR SUBSTANCES EMPLOYED TO CLEANSE FOUL SORES AND TO PROMOTE HEALTHY ACTION

The list here given has been drawn up so as to exclude as far as possible, external applications employed for other purposes than the above

Acacia arabica, *Willd* A poultice of the bruised tender leaves is applied to ulcers
Adiantum venustum, *Don* Applied to bruises
Ægle Marmelos, *Correa* Leaves made into poultice and employed in ophthalmia, &c
Agave americana, *Linn* Fleshy leaves used as poultice
Albizzia amara, *Boivin* Poultice to ulcers
A odoratissima, *Benth* Bark efficacious in leprosy and inveterate ulcers
Alstonia scholaris, *R Br* Milky juice applied to ulcers
Anamirta Cocculus, *W & A* An ointment employed as an insecticide to destroy pediculi, &c, and in obstinate skin diseases

MEDICINAL DETERGENTS.

Argyreia speciosa, *Sweet*. Root used by the Santals in the cure of running sores.

Artemisia vulgaris, *Linn*. An infusion of the leaves applied as a fomentation in ulcers.

Artocarpus integrifolia, *Linn*. The young leaves used in skin diseases and the juice applied to abscesses to promote suppuration.

Asagræa officinalis, *Lyndl*. A decoction used to destroy pediculi.

Avicennia tomentosa, *Jacq*. Unripe seeds used as a poultice to hasten suppuration.

Balsamodendron Mukul, *Hook*. Resin used in preparation of an ointment for bad ulcers.

B. Myrrha, *Nees*. A detergent to cold tumours.

B. Opobalsamum, *Kunth*. Resin made into a paste with lard is applied in scrofulous and cancerous sores.

B. pubescens, *Stocks*. Resin in form of ointment may be applied to cleanse and stimulate ulcers.

Bauhinia variegata, *Linn*. Bark is useful in scrofula, ulcers, &c.

Boswellia serrata, *Roxb*. An ointment of the resin is applied to ulcers, &c.

Calophyllum inophyllum, *Linn*. Resin used for indolent ulcers.

Capparis horrida, *Linn. f*. Cataplasm of leaves useful in boils, swellings, and piles.

Cassia alata, *Linn*. Leaves used for ringworm and other skin diseases.

C. Fistula, *Linn*. Bark and leaves used in skin diseases.

C. occidentalis, *Linn*. Same as above.

C. Sophora, *Linn*. Bark, leaves, and seeds with sandal-wood regarded as a specific in ringworm.

C. Tora, *Linn*. Bark, leaves, and seeds used in ringworm.

Cedrus Deodara, *Loud*. The oil from wood used as a remedy for ulcers, &c., and for sore-feet in cattle.

Cerevisiæ Fermentum (Yeast). Used as poultice.

Ceriops Candoleana, *Arnott*. Decoction of bark applied to malignant ulcers.

Citrus Aurantium, *Linn*. Poultice of oranges is recommended in skin affections.

Colchicum autumnale, *Linn*. Used in obstinate skin diseases.

Conium maculatum, *Linn*. An extract used in tumours.

Cordia Myxa, *Linn*. Kernels employed in ringworm.

Curcuma longa, *Roxb*. A paste made of the flowers is used in ringworm and other parasitic diseases.

Cycas Rumphii, *Miq*. Resin applied to malignant ulcers; it excites suppuration in a very short time.

Cynometra ramiflora, *Linn*. Lotion of the leaves in milk applied to skin diseases.

Delphinium cœruleum, *Jacq*. Roots applied to kill maggots in the wounds of goats.

Desmodium triflorum, *DC*. Fresh leaves applied to wounds, &c., that do not heal well.

Dioscorea bulbifera, *Linn*. Powdered tuber applied to ulcers. This remark is applicable to most yams.

Diospyros montana, *Roxb*. The fruit, placed by *Bhistis* on the boils which generally appear on their hands.

Dipterocarpus turbinatus, *Gærtn*. Wood oil applied to ulcers, ring-worm.

Embelia Ribes, *Burm*. Fruits made into various remedies for ring-worm and skin diseases.

Ervum Lens, *Linn*. Poultice applied to ulcers and in small-pox, &c.

Eugenia operculata, *Roxb*. Leaves used by the Santals in dry fomentation to sores.

MEDICINAL DETERGENTS

Ferula Narthex, *Boiss* or F. alliacea, *Boiss* The resin employed as a paste in ringworm

Ficus bengalensis, *Linn* Heated leaves applied as a poultice to abscesses

F Carica, *Linn* Fruit used as a poultice

F Cunia, *Buch* A bath made of the fruit and bark is regarded as a cure for leprosy

Flemingia congesta, *Roxb* Santals use the root as an application to ulcers and swellings on the neck

Garcinia indica, *Chois* Kokum butter is employed in indolent sores

Gardenia gummifera, *Linn f* Gum used to keep off insects from sores on cattle

Grewia asiatica, *Linn* Leaves applied to pustular eruptions

Gynandropsis pentaphylla, *DC* Ointment made of the plant with Sesamum oil, is used in skin diseases

Gynocardia odorata, *R Br* Oil used extensively in skin diseases, scrofula

Helicteres Isora, *Linn* Fruits made into a liniment for sores in the ear

Heliotropium brevifolium, *Wall* Juice used to promote suppuration

Hibiscus esculentus, *Linn* Fresh capsules are employed as a demulcent and emollient poultice

Hiptage Madablota, *Gærtn* Leaves esteemed in skin diseases

Holarrhena antidysenterica, *Wall* Fruits made into a paste to allay pain in wounds

Hydrocotyle asiatica, L [illegible]

I [illegible]

I [illegible]

and cancerous affections

I tinctoria, *Linn* An ointment is made from the extract which is used in sores The dry powder is sprinkled over foul ulcers to cleanse them

Jasminum humile, *Sims* The root has been found useful in ringworm

J officinale, *Linn* Same as above

Jatropha Curcas, *Linn* The milky juice is said to be detergent.

Kalanchoe spathulata, *DC* Leaves in Kangra are burned and applied to abscesses

Lagenaria vulgaris, *Seringe* The pulp used as a poultice.

Lawsonia alba, *Lam* A decoction of the leaves applied to ulcers, sores

Lepedieropsis orbicularis, *Mull* The bark is used by the Santals in skin diseases.

Lepidagathis cristata, *Willd* The ashes are used by the Santals in the cure of sores

Linum usitatissimum, *Linn* Seeds employed as a poultice.

Luffa acutangula, *Roxb.*, var. Amara. Leaves applied to sores in cattle

Lycopodium clavatum, *Linn* Applied to boils, carbuncles, and papular eruptions, &c.

Malva rotundifolia, *Linn* Seeds employed in skin diseases

Mangifera indica, *Linn.* The gum-resin mixed with lime-juice or oil is applied to cutaneous affections, scabies, &c.

Melia Azadirachta, *Linn* Leaves made into poultice are applied to ulcers and skin diseases of long standing. An oil [illegible] used

M. Azadarach, *Linn* Leaves and bark made into poultice, which is employed in leprosy and scrofula. A poultice of the flowers is used to kill lice and to cure eruptions of the scalp.

Mesua ferrea, *Linn* A paste of the flowers with butter and sugar is used in piles.

Millettia auriculata, *Baker.* [illegible] applied to sores on cattle to kill worms

D. 250

MEDICINAL DETERGENTS.

Mirabilis Jalapa, *Linn.* The leaves used as a poultice to promote suppuration.

Momordica Charantia, *Linn.* Whole plant powdered and applied in leprosy and malignant ulcers.

Morinda citrifolia, *Roxb.* The leaves used to promote healthy action in wounds, ulcers, &c.

Nelumbium speciosum, *Willd.* The root is used as a paste in ringworm, &c.

Nerium odorum, *Soland.* The root is said to be highly efficacious in skin diseases.

Nigella sativa, *Linn.*, **var. indica.** The seeds in combination with sesamum oil are used for skin eruptions.

Nyctanthes Arbor-tristis, *Linn.* The powdered seeds are used to cure scurfy affections of the scalp. The Santals employ a preparation of the root to cure goose-skin.

Ocimum Basilicum, *Linn.* The juice of the leaves useful in ringworm.

O. canum, *Sims.* The leaves made into a paste are used by the Santals in the cure of parasitic skin diseases.

Odina Wodier, *Roxb.* A decoction of the bark is useful in old ulcers.

Olea europea, *Linn.* The oil is applied to skin diseases.

Oroxylum indicum, *Benth.* A powder made from the bark is employed in the cure of sore-backs of horses.

Oxystelma esculenta, *Br.* The milky sap is used in Sind for ulcers.

Oryza sativa, *Linn.* Rice poultice, largely used as a substitute for linseed.

Pedalium Murex, *Linn.* Leaves employed as a useful poultice.

Penæa mucronata, *Linn.* The gum applied to sloughing ulcers.

Peucedanum graveolens, *Benth.* Leaves moistened with oil are used as a poultice or suppuracive.

Phyllanthus simplex, *Linn.* Root applied to mammary abscesses.

Pieris ovalifolia, *D. Don.* The young leaves and buds are used to kill insects, and an infusion is employed in cutaneous diseases.

Pinus longifolia, *Roxb.* Resin used as a plaster to abscesses in order to cause suppuration.

Pistacia Terebinthus, *Linn.* The turpentine is considered very valuable in cancer.

Pongamia glabra, *Vent.* A poultice of the leaves is applied to ulcers infested with worms: the juice of the root is used as a wash for foul sores; the oil is one of the best native remedies for cutaneous diseases.

Rhinacanthus communis, *Nees.* Root-bark used in dhobi's itch.

Saponaria Vaccaria, *Linn.* Juice used as a detergent and in the cure of itch.

Sesamum indicum, *Linn.* A poultice of the seeds applied to ulcers.

Sesbania ægyptiaca, *Pers.* Leaves, as a poultice to promote suppuration.

Tamarindus indica, *Linn.* Poultice of the seeds is applied to boils, &c., and of the leaves and pulp of the fruit to inflammatory swellings.

Tamarix gallica, *Linn.* Strong infusion of galls applied to foul ulcers.

Terminalia Arjuna, *Beddome.* Decoction of bark used in ulcers and cancers.

Thespesia populnea, *Corr.* The yellow juice of fruit is used in cutaneous diseases.

Trichosanthes dioica, *Roxb.* The root is resorted to in treatment of leprosy.

Vallaris Heynei, *Spreng.* Milky juice applied to wounds and sores.

Vernonia anthelmintica, *Willd.* Seeds of great repute in Sanskrit Materia Medica for white leprosy and other skin diseases.

Vitex Negundo, *Linn.* The juice of the leaves has the property of removing fœtid discharges from ulcers.

MEDICINAL DETERGENTS.

Woodfordia floribunda, *Salisb* The powdered flowers are sprinkled over ulcers to promote granulation

Zizyphus vulgaris, *Lam.* The bark is used to clean wounds and sores

IV.—DENTIFRICES AND TOOTH BRUSHES

DENTIFRICES. 361

Materials used to clean the teeth may, as a matter of convenience, be given here under Detergents.

The following list indicates those most frequently mentioned by authors —

Abutilon indicum *Don* A decoction of the bark is used as a mouthwash in toothache.

Acacia Catechu *Willd.* Cutch is recommended as a dentifrice along with charcoal.

A. ferruginea, *DC.* A decoction of the bark is employed as a toothwash.

A modesta, *Wall.* Twigs used by the Panjabis as tooth-brushes.

Areca Catechu *Linn.* The burnt nuts reduced to a powder have been recommended as a dentifrice.

Aristida setacea, *Retz.* According to Roxburgh the culms are used in South India as tooth-[brushes].

Calotropis gigantea, *R. Br* & C. procera, *R. Br* Twigs used as tooth-brushes.

Cassia auriculata, *Linn.* Twigs used as tooth-brushes. A considerable trade is done in these, they are esteemed as preferable to the tooth-brushes obtained from any other plant.

Citrullus Colocynthis, *Schrad.* Fresh root used as tooth-brush.

Cuttle-fish (or Sea-foam). Employed in the manufacture of tooth powder.

Datura alba, *Nees.* Powder of the seeds used to deaden pain.

Daucus Carota, *Linn.* Leaf-stalks employed [illegible].

Euphorbia antiquorum, *Linn.* Juice given in toothache.

Ficus bengalensis, *Linn.* Juice given in toothache.

Indigofera aspalathoides, *Vahl.* Root chewed in toothache.

I paucifolia, *Delile.* Used in Sind by Hindus.

[illegible]

Melia Azadirachta, *Linn.* Twigs used as tooth-brushes.

Moringa pterygosperma, *Gaertn.* The bark employed in toothache.

Pistacia Lentiscus *Linn.* The mastic [illegible] for filling up cavities in teeth.

Plumbago rosea, *Linn.* Root applied in the cure of toothache.

Pontederia vaginalis, *Linn.* The root chewed in toothache [illegible].

Prunus Amygdalus, *Baillon.* The powder [illegible].

Pterocarpus Marsupium, *Roxb* Gum employed in toothache.

Rumex vesicarius, *Linn.* Juice given in toothache.

Salvadora persica, *Linn.* Twigs used as tooth-brushes [illegible] Panjab.

Solanum indicum, *Linn.* The root employed in toothache.

S. xanthocarpum, *Schrad & Wendl.* The fruit is used [illegible] by the Santals for toothache. Fumigation [illegible] great repute for toothache.

Streblus asper, *Lour.* Twigs employed as tooth-brushes.

Ventilago calyculata, *Tulasne.* [illegible] the finger intended as a [illegible] toothache.

Wrightia tinctoria, *R. Br.* The [illegible] relieve toothache.

Xanthoxylum alatum, *Roxb.* Twigs used as tooth-brushes [illegible] toothache.

DENTIFRICES.

Zizyphus rugosa, *Lamk.* The powdered bark is employed by the Santals as a cure for toothache.

362

DEUTZIA, *Thumb.; Gen. Pl., I., 642.*

A genus of highly ornamental shrubs, belonging to the SAXIFRAGEÆ, which have come into much favour by European gardeners, on account of their bunches of handsome white flowers. The rough star-shaped hairs on the leaves are serviceable in place of sand-paper, and the timber is used as fuel. The two Himálayan species are **D. corymbosa**, *Brown* (the *Daloutchi*), and **D. staminea**, *Brown* (the *Muneti* of KUMAON; *Deutsch*, SIMLA; *Phul Kanri*, HAZARA; *Phurlé*, KASHMIR; *Sai*, CHUMBA; and the *Aruchi* or *Deús* of BASHIRH).

Devil's Tree and **Dita Bark**, see **Alstonia scholaris**, *R. Br.*, Vol. I., [No. 870.

363

Dextrine or **British Gum.**

A chemical substance present in most grains, having the formula $C_{12}H_{10}O_{10}$. Wheat contains 4·5; wheat-bran, 5·52; barley, 6·55; rye-bran, 7·79; malt, 8·22. In commerce the term is applied to the substance artificially produced by the transformation of starch—the granules on bursting under the influence of heat constitute British Gum. This is largely used in calico-printing, paper-glazing, gumming envelopes and postage stamps. It seems probable that a very large proportion of the Rice exported from India to Europe is employed in the manufacture of Dextrine. See **Oryza sativa.**

Dhal, see **Cajanus indicus**, *Spreng.*, Vol. II., No. 49.

Dhourra, a name often given to the millets collectively.

Dhub or **Dub**, see **Cynodon Dactylon**, *Pers.*, Vol. II., No. 2558.

364

DIAMOND, *Man. Geology, Ind., III., pp. 1-50, IV., p. 8.*

DIAMANT, *Fr.*, *Germ.*, *Dutch*; DIAMANTE, *It.*, *Sp.*; ALMAS, *Russ.*

Vern.—*Hirá*, HIND.; *Almás*, ARAB. and PERS.; also in PERSIAN *Mas.*; *Hiráka*, SANS.; *Adamas*, GREEK and LATIN.

References.—*Records of Geol. Survey of Ind., II., 9; V., 27; X., 58, 186; XVIII, 24; XIX., 109, 208; Mem. of G. S. Ind., II., 65; VII., 113; VIII., 106, 267; XII., 144; XVI., 253; Jour. As. Soc. Bengal, II., 403; V., 111; VIII., 379, 1057; XI., 399; XIII., 859; XV., 390; XXXIV. Pt. II., 13; XL., Pt. I., 11; L., 39, also Pt. II., 31; Jour. Royal As. Soc., VII. (Old Series), by Capt. Newbold, pp. 226, 233; VII. (New Series), 125; Trans. R. A. S., I., 277; As. Res., XV., 120, 125; XVIII., 100; Madras Jour. Lit. & Sc., III., 120; VI., 47; Trans. Med. & Phys. Soc., Calcutta, II., 261, 264; Trans. Geol. Soc., London, 2nd Series, V., pp. 541, 568; Jour. Geol. Soc., London, XI., 355; Voyage, John Huyghen van Linschoten, in 1596 (Trans. by Hakluyt Soc.), II., 136; Tavernier (1665-1669), Voyages, II.; Cæsar Frederick, 1570 (Hakluyt's Voyages); Marco Polo (13th century), Ed. by Col. Yule, Vol. II, 295; New account of the East Indies by Capt. Hamilton (1688 1728), Vol. I., XXIX., 306; Ain-i-Akbari by Abul Fazl (1590), Trans. by Gladwin, II., 7, 11, 32, 59; Blochmann's Trans., p. 480; Tuzuk-i-Jahángiri, pp. 154-155; Mustapha (1758), Oriental Report, London, 1799; Dr. Heyne (1814), Tracts, London, p. 92; Capt. Burton (1876); Quart. Jour. Sc., New Series, Vol. VI., 351; Mani Mala by Raja Sourendro Mohun Tagore; Kelsall (1872). Bellary Dist. Man., p. 24; Jenkins, Report of Nagpur; Temple, Adm. Rep., C. P., 1861-62, p. 124; C. P. Gazetteer; Dr. Shortt (1855), Selections, Records, Beng. Govt., Vol. IV., No. XXIII., p. 182; Sel. Records, Madras Government, No. XIV;*

The Diamond (*G Watt*) DIAMOND.

WHERE FOUND
365

(the former of which probably afforded the Golconda diamonds, a name given to them from the ancient kingdom of Golconda), and, *third*, Chutia Nagpore and the Central Provinces to Bundelkhand

It is somewhat remarkable that the Indian diamonds have not as yet

the lessened trade in modern times is more due to the conservative character of the diggers, in keeping their art a secret or to the exhaustion of the

in addition to the above explanation, to the discovery of the stone elsewhere, and to the application of cheaper methods of working diamond mines in other countries than are known to the people of India

For centuries the Indian mines have been held by poor workmen who unaided by science, have had to depend on their hereditary skill while

large extent been lost. At the same time it should not be forgotten that the diamonds which found their way all over the civilized world from the Indian mines—the *Adamas* of the Greek and Latin writers—may have largely represented the surplus accumulation of gems collected during many previous centuries

Some of the oldest Sanskrit writers allude to the diamond, and it appears to have been worn by the nobility of India long anterior to the earliest European mention of it At the same time it is significant, as Mr. Ball points out (*Economic Geology of India, p 3*), that the

DIAMOND.

The Diamond.

HISTORY.

Hindus are not now and probably never were professional diamond diggers. The greater part of the Indian mines are worked by Gonds or Kóls; for, as Mr. Ball adds, "the miners in South India, though some of them are said to be Hindus and others are simply described as low out-castes, all probably came from the same family. It may, of course, be said in answer to this that the mining and washing would naturally fall to the lot of Helot races; but in some of the localities it is doubtful whether the Aryans ever held paramount power." It would not, therefore, be a great stretch of imagination to picture the aboriginal races of India using diamonds as playthings prior to the Aryan invasion, as putting in fact little more value on them than the Negroes of Brazil did, who employed their diamonds as counters in games of cards. The Aryans bringing with them wealth and enlightenment might be supposed to have soon given to the Indian gems their true value, while leaving the art of digging in the hands of the aborigines in whose country they were found. Everything, therefore, points to India having always had a limited and conservative diamond-mining community with whom it might be easily supposed the art, under adversity, would not have continued to prosper. Even assuming that the first washings of the surface beds afforded a richer yield than the subsequent re-washings of the same materials (and this is admittedly what has actually taken place), there still remains the fact that few gems have in modern times been discovered that are in any way equal to those now in the possession of the great monarchs of the world—gems, the individual histories of which are lost in the obscurity of a remote antiquity. The view may thus be admissible that the Royal Diamonds have been handed down from generation to generation, and that each represents an accidental discovery, a it marks as period of human history. The prevalent opinion, advanced by the early writers and held still by the modern Indian diggers, as to "diamonds growing," accounts for the persistence with which the same materials have been searched over and over again; and it has its explanation in the fact that the natural disintegration of the matrix brings to light stones not discovered in a former washing, from their having been closely encrusted by earthy materials. But the theory of growth has been exploded both by the chemist and the European digger. The diamond is now known to be a crystalline state of pure carbon, formed under geological influences, of which analytical research may be said to have established the rationale, but which constructive or synthetical efforts have at most only approximated towards demonstrating. We may decompose the diamond but cannot make it.

One of the older European writers who visited India and wrote of the diamond (John Huyghen van Linschoten) describes it as growing:—

"Diamonds," he says," by the Arabians and Moores called *Almas* and by the Indians, where they grow, *Iraa*,* and by the Malayans, where they are likewise found, *Itam*."† "They grow in the countrie of Decam behinde Ballagate, by the towne of Bisnagar, wherein are two or three hills from whence they are digged, whereof the King Bisnagar doth reape great profitte: for hee causeth them to be straightly watched, and hath farmed them out with this condition that all Diamonds that are above twenty-five Mangelyns in waight are for the King him selfe (every Mangelyn is foure graines in waight),‡ and if anie man bee found that hideth anie such, he looseth both life and goods. There is yet another

* *Hirá*, SANS.

† The Malay name *Iutan* comes from the Javanese *Huilen*, which, again, is derived from the Sanskrit.

‡ According to Mr. Ball in Tavernier's time (*Econ. Geol., p. 21*) "a Mangelin = 1¾ carats or 7 grains at Raolconda and Coulour; the rati being ⅞ of a carat or 3½ grains. But 1·843 grains is more probably the correct equivalent of the Hindú *rati*."

HISTORY.

hill in the countrie of Decam, which is called Velha, that is, the old Rocke" (= [illegible]
and are sol [illegible]
and Indiar [illegible]
"These [illegible]
in a Town [illegible]
Goa and C [illegible]
goe and buy them up bringing them to Goa, and other places. They are very skilfull in these matters, so that no Jeweller can goe beyond [illegible] Jewellers in all Christendome [illegible] founde that are called *Nayfes* [illegible] more esteemed than the rest, [illegible] In the Straight called Tama- [illegible]alacca,† there is likewise an [illegible]
but verie few"

It may here be suggested that it is curious Linschoten did not learn of the discovery in the [illegible] large stones such as the Grea [illegible]

[illegible]

century wrote of them, [illegible]

[illegible] of inspecting the diamond mines As the result, much more precise information became current in Europe after the publication of his voyages than before He visited the Emperor Aurangzeb on the 1st November 1665, and on the next day was permitted to examine and weigh the Court jewels The largest diamond shown him he appears to have named 'The Great Mogul' This, he was informed, had been obtained from the Coulour mines (Kollur, in the Kistna district, Madras)—mines opened out, as he affirms, only a hundred years before the date of his visit to India This would correspond [illegible]

The Great Mogul
366

Koh-i nur
367

* Probably Elichpur the old capital of Berar

† 'Taodjong Pura the old capital of Matan on the west coast of Borneo It is mentioned by Castanheda and others as a town from wl ch came d amonds'

HISTORY.

refers to the most recent large diamond found in India (1881). It came from the Bellary district, and was purchased by the firm of Messrs. P. Orr & Sons of Madras. When cut as a brilliant of the purest water it weighed 24¾ carats. This, as a kind of parody on *Koh-i-nur*, received the name of *Gor-do Norr* in honour of the senior partner of the firm, Mr. Gordon Orr. On the other hand, many writers hold that the *Koh-i-nur* was so named by Nadir Shah (the Persian invader of India in 1739) from whose successor in 1813 it passed into the hands of Runjit Sing. In 1849 on the annexation of the Panjáb it again changed hands, and was presented shortly after to Her Majesty the Queen-Empress of India.

Gor-do-Norr.
368

On the other hand, a much greater antiquity is sought to be established for the *Koh-i-nur*. A legend asserts that it was found in one of the mines in the Kistna district, and was worn 5,000 years ago by Karna, one of the heroes celebrated in the *Mahábharata*. It is then said to have passed through many hands until presented to Bábar, the founder of the Mogul dynasty in 1526, and thus descended to Aurengzeb, son of Shah Jahán. Tavernier, however, expressly states that it came to the Mogul Emperors in the time of Shah Jahán, and it is significant also that Abul Fuzl, in his *Ain-i-Akbari*, while dwelling at length on the high personal character and great wealth of Akbár (the great-grandson of Babár), makes no mention in the list of Court jewels of any diamond that could compare with either the Great Mogul or the *Koh i-nur*. In the *Tuzuk-i-Jahángiri* some interesting facts are given regarding the Court jewels in Jahangir's time (son of Akbár), but no mention is made of the Great Mogul, so that Tavernier's statement may be accepted as correct that it came into the hands of the Mogul Emperors during the reign of Shah Jahán (son of Jahangir). This would not, however, preclude the possibility of its having been in the possession of the Kings of Golconda for many previous generations, or even detract from the probable accuracy of the tradition that it was once worn by Karna. Indeed, the king of a region from which the majority of the great diamonds were obtained, might fairly well be expected to have retained in his own family some of the best gems ever found. This is the more easily admissible when it is recollected how futile had been the efforts to conquer the diamond king, and that even Shah Jahán owed some degree of his ultimate success to the treachery of Mirimgola.

A far greater difficulty exists in tracing the Mogul diamond after the date of its having been inspected and weighed by Tavernier. On the death of Aurangzeb, the Mogul Empire rapidly fell, and from 1720 it may be said to have begun the final stage of breaking up. In 1739, the Persian invader Nadir Shah overthrew what vestiges remained of the Great Muhammadan Empire—an empire that had lasted for over two hundred years, *viz.*, from Bábar to Muhammad Bahádar Shah, the last of the race of Timur The Persians sacked the city of Delhi and carried off money and treasure to the value of 32 millions sterling, including the Great Mogul Diamond.

Tavernier does not, however, say that that gem was found a hundred years before the date of his visit to Aurangzeb, but that the Coulour mines were opened out then. The great diamond might have been picked up centuries before, although, as pointed out above, Linschoten's silence as to the existence of any one exceptionally large diamond might be accepted as leading to an opposite inference. Some capital has been made out of Tavernier's contradictory statements regarding the weight of the gem when presented to Shah Jahán—in one place 900 ratis = 787½ carats, in another 907 ratis = 793⅝ carats. But it should be borne in mind that that was only the weight he was told it then possessed, and he may be

HISTORY.

pardoned a discrepancy which after all is not of serious consideration. When shown to him it had been cut, and he is perfectly consistent in stating, wherever he alludes to it, that on his weighing it he found it to be 319½ ratis, or 280 carats. A good deal of discussion has taken place also as to whether Tavernier's Great Mogul Diamond of 280 carats was one and the same with the Koh-i-nur. Some writers affirm that during the time it was in the possession of the Persians, it was cut or broken by cleavage, and that from the Great Mogul was derived the Orloff diamond, and also a gem still in the possession of Persia. The Orloff diamond, now in the sceptre of the Emperor of Russia, is in the form of a half pigeon's egg, and weighs 194¾ carats. The Koh-i-nur, when it came to England, weighed 186$\frac{1}{16}$ carats, and might be described to have been a defective half egg. It has since been cut in the rose, and weighs 106$\frac{1}{16}$ carats. If the removed portion from the top of the Koh-i-nur were accepted as corresponding with the Orloff gem, the latter should have weighed considerably less than the former, and if a lower portion of the Koh-i-nur gave origin to the Orloff gem, it would be difficult to account for its shape as that of a half egg. But reasoning on these lines goes on the assumption that to account for the Orloff and Koh-i-nur as parts of one original diamond, they were parts of the diamond as seen and figured by Tavernier. It would seem that this idea has so pervaded the writings of authors who have treated of this subject that the fact that the stone presented to Shah Jahan had been reduced from 787 to 280 carats has been lost sight of. It is just possible that the severe treatment bestowed on the Venetian, Hortensio Borgio, who cut the stone for the Mogul Emperor, was because of a well-founded suspicion that he had cut off large pieces which were never accounted for. If this supposition be admissible, then the Great Mogul gem, with small pieces chipped off it while in Persia, might easily be accepted for the diamond known as the Koh-i-nur, while the somewhat mythical story of the Orloff having been picked off a Hindu idol might be viewed as the manner in which the largest of all diamonds was again restored to public notice. The person who cut the Great Mogul in the form of a half egg might have followed the same method in forming the Orloff. All this is, however, pure speculation, and the main interest [illegible]

the Koh-i-nur [illegible]

[illegible]

PRODUCTION [illegible]

[illegible] large diamonds, [illegible] comparable to those discussed above, have not been found [illegible] Various reasons have been suggested for the [illegible] and it is perhaps only necessary in this place to state that [illegible] seems likely to attract much greater attention in the future. [illegible] has recently been examining the Hyderabad Diamond Fields [illegible] a definite report has not as yet been [illegible] have had a hopeful forecast placed [illegible] sary to quote here a complete [illegible] fields that are actually being worked [illegible] tioned, premising that [illegible] portant, the [illegible] only a precarious [illegible]

MADRAS.—In the *District Manuals* and the *Imperial Gazetteer* [illegible] notices occur regarding the diamond [illegible] Madras Presidency. [illegible] passage taken from the *Manual of the Madras* [illegible] "The diamond-bearing [illegible]

Orloff. 369

PRODUCTION and PROSPECTS. 370

Madras. 371

DIAMOND. The Diamond.

POSITION AND PROSPECTS.

extent in the Kurnool basin, especially on its western side. They have been mined at Bunganapully, Moonimadoogoo, and Goorramcondah in the latter district. At Ramalcottah and several other places in Kurnool district diamonds were, and are still, obtained by washing local alluvia formed of the *débris* of the diamond conglomerate. At and near Chenur, in Cuddapah district, the gravel beds in the alluvium of the Pennair river, which consists largely of *débris* of rocks belonging to the Karnool system, were formerly washed on a large scale, though now almost abandoned. Considerable tracts of the diamond conglomerate—the 'Bunganapully conglomerates' of the Geological surveyors—have been left untried as yet by the native miners. Conglomerate beds belonging to the Cuddapah system were formerly mined for diamonds in the Kistna district, where deserted villages occur in great numbers to the north and west of Chintapully. To this set of mines belonged the old workings at Collor, on the Kistna, which has been identified, on good grounds, with the Gani Coulour of Tavernier, where the Koh-i-nur was obtained. The Ramalcottah and Bunganapully mines and workings appear still to yield a remunerative supply of small and rough diamonds; the right to mine being sold at a yearly auction. The so-called Golcondah mines, either of Gollapully near Ellore or in some parts of the Golcondah range of the Eastern Ghauts north of Rajahmundry, have been long deserted."

Hyderabad. 372

NIZAM'S DOMINIONS.—"When the Nizam ceded the Northern Circars to the British, he was permitted to retain possession of all the village lands of this area in which diamond mines were situated, and these villages now stand isolated in the British Kistna and Godavari districts. The revenue derived from them by the Nizam at present from ordinary agricultural resources is not inconsiderable; but the diamond mines yield little or nothing. Eighty years before Heyne's visit, or about the beginning of the eighteenth century, they belonged to a powerful zamindár called Ooparow, but on his discovering the diamonds they were taken possession of by his sovereign the Nizam." Some of these mines have already been alluded to, such as the Kollur (Color). In that mine it is now generally believed the Koh-i-nur was found, and not at Partial, though it seems fairly certain the Pitt gem was found at the latter. The expert presently examining the mines in Hyderabad has published certain facts of interest. His communication has been discussed as follows in the *Pioneer*:—"The workings are very extensive, some being five miles in length. They are all of a superficial character, not extending below 15 feet from the surface. Wherever water or rock was met the native workers could not compete with the difficulty. The soil indications are said to be extremely satisfactory, and in many places similar to those found at Kimberley and elsewhere in South Africa. Although the diamond workings have not been carried on since the beginning of the century, a few individuals still employ themselves in re-washing the old *débris*, and the expert was shown one or two small diamonds found by them of fairly good colour." The report alluded to describes the primitive method pursued in washing and sifting for the diamonds, the information given being concluded with the following:—"By the 26th January the expert had again started from Secunderabad for Purtyal with a convoy of 80 bullock carts carrying all the necessary machinery for testing and working the different places described by him. He states that he hopes to be able shortly to send a further report in the shape of a parcel of diamonds." He adds:—"It is of course not in my power to be able to say with any certainty that I shall find diamonds in payable quantities, but I do not suppose for one moment that the diggings are worked out, particularly as the natives have not worked the ground regularly but have left ground untouched between

POSITION AND PROSPECTS.

all the pits which is of the same soil and, therefore, just as likely to be diamond bearing as the pits themselves." He concludes: "I have every confidence in the venture, but do not like to be over-sanguine, and as it will not be very long before the ground will be thoroughly tested, I prefer to confine myself to saying that the chances are very much in favour of [illegible]

[illegible]

taken place within the last 80 or 90 years. [illegible]

[illegible]

CENTRAL PROVINCES, SAMBALPUR DISTRICT.—Some [illegible] Mr Ball states, "exists as to how far the [illegible] ing localities of Gondwana are applicable to those [illegible] basin." "The first visit to Sambalpur, of which there is any [illegible] account, is described in the narrative of a journey which was [illegible] by Mr Motte in the year 1766. The object of this journey was [illegible] a regular trade in diamonds with Sambalpur, Lord Clive being [illegible] employing diamonds as a convenient means of [illegible] England. [illegible]

[illegible] person to purchase diamonds [illegible] The Governor proposed to Mr. Motte to make the speculation a joint concern, in which," writes the latter, "I was to hold a third; he the other two, all the expenses to be borne by the concern. The proposal dazzled me and I caught at it without reflecting on the difficulties of the march or on the barbarity of the country, &c." "In spite of his life being several times in danger from attacks by the natives, the loss of some of his followers by fever, and a varied chapter [illegible] Motte was [illegible] ion above [illegible]

[illegible] between the island and the right bank. The [illegible] 10 miles above Sambalpur." In the Medical Topography of the districts of Ramgurh, Chutia Nagpur, Sirgooja, and Sambalpur (dated 18[illegible]) [illegible] additional information is given regarding the Sambalpur diamonds [illegible] fixes the diamond region on the north side of the river. A large stone is said to have been found in 1809 in these mines. This is reported to have weighed 210·6 carats and to have fallen treacherously into the hands of the Mahrattas. Nothing further has been heard of this stone, but it is presumably one of the great gems the history of which [illegible] Central Provinces Gazetteer, upon what authority is not known [illegible] that the diamonds of Sambalpur are flat and [illegible] Some of the older writers on the contrary state that [illegible] Nagpur stones they were of the best quality and the purest water [illegible] Imperial Gazetteer it is simply stated that diamonds are [illegible] found near an island called Hirakuda or Diamond Island. [illegible]

DIAMOND. The Diamond.

POSITION AND PROSPECTS.

pur was finally taken over by the British in 1850, the Government offered to lease out the right to search for diamonds, and in 1856 a notification appeared in the *Gazette* describing the prospects in somewhat glowing terms. For a short time the lease was held by a European at the low rate of R200 a year, but it was soon given up. Mr. Ball adds that, though reports are often made of diamonds found at Sambulpur, "recent local inquiries failed to elicit a single authentic case, and the gold-washers asserted that these statements were incorrect."

Of the mines in the Chanda district it may be said that, although these are of considerable extent and are most probably the Bairagarh mines mentioned in the *Ain-i-Akbari*, Mr. R. Jenkins, in his report on the territories of the Rajah of Nagpúr, states "that they were formerly celebrated, but in his time did not yield sufficient returns to make them worth working."

Bundelkhand. 374

Bundelkhand, Panna.—In the *North-Western Provinces Gazetteer* (*Vol. I., Bundelkhand, p. 565*) will be found a detailed account of the past and present of the Panna diamond mines. This has been condensed and reproduced in the *Imperial Gazetteer* as follows:—"The ground on the surface and for a few feet below," says Mr. Thornton from whom this paragraph is compiled, "consists of ferruginous gravel mixed with reddish clay; and this loose mass, when carefully washed and searched, yields diamonds, though few in number and of small size. The matrix containing in greater quantity the more valuable diamonds lies considerably lower, at a depth varying generally from 12 to 40 feet, and is a conglomerate of pebbles of quartz, jasper, hornstone, Lydian stone, &c. The fragments of this conglomerate, quarried and brought to the surface, are carefully pounded; and after several washings to remove the softer and more clayey parts, the residue is repeatedly searched for the diamonds. As frequently happens in such speculative pursuits, the returns often scarcely equal the outlay and the adventurers are ruined. The business is now much less prosperous than formerly, but Jacquemont did not consider that there were in his time any symptoms of exhaustion in the adamantiferous deposits, and attributed the unfavourable change to the diminished value of the gem everywhere. The rejected rubbish, if examined after a lapse of some years, has been frequently found to contain valuable gems, which some suppose have in the interval been produced in the congenial matrix; but experienced and skilful miners are generally of opinion that the diamonds escaped the former search in consequence of encrustation of some opaque coat and have now been rendered obvious to the sight from its removal by fracture, friction, or some other accidental cause. More extensive and important than the tract just referred to is another extending from 12 to 20 miles north-east of the town of Panna and worked in the localities of Kamariya, Brijpur, Bargári, Maira, and Etwa. Diamonds of the first water, or completely colourless, are very rare; most of those found being either pearly, greenish, yellowish, rose-coloured, black or brown." Sir W. W. Hunter adds that, according to Pogson, "inexhaustible strata producing diamonds exist here." "None of the great diamonds now known appear to be traceable to the mines in Panna, and Tieffenthaler mentions it as a general opinion that those of Golconda are superior." During the prosperity of the mines a tax of 25 per cent. was levied on their produce, but the tax now imposed is stated to exceed this rate. The revenue is divided in proportions between the Rajahs of Panna and Charkhári. The value of the diamonds still found in the mines is estimated at £12,000 per annum." Mr. Ball gives a brief account of these mines written by Mr. Medlicott and a picture of the miners at work in a shaft as seen by the late Mr. Jules Schaumburg.

POSITION AND PROSPECTS. Bengal. 375

BENGAL, CHUTIA NAGPUR.—Repeated reference has been made to the diamonds found in Chutia Nagpúr. Space cannot, however, be afforded to deal in full with the mines that are said to have existed, nor even to do justice to the historic references to them. But they are not generally regarded as of much importance. Mr. Blochmann's paper on the subject of Kokrah (= the ancient name of Chutia Nagpur) is, however, of very great interest. The diamonds possessed by Akbar and his son Jahangir are said to have been largely drawn from the mines in Chutia Nagpúr. The reader is referred to Mr. Ball's detailed account of Indian diamonds in the *Manual of the Geology of India, Vol. II., pp. 1—58.*

MEDICINE. 376

Medicine.—Diamond dust is known to be a powerful mechanical poison. In Hindu practice it is, however, to some extent, used as a drug. Dutt says that, according to Sanskrit authors, the diamond for medicinal purposes is purified by being enclosed within a lemon and boiled in the juice of the leaves of Sesbania grandiflora. It is reduced to a powder in the following manner: "A piece of the root of a cotton plant is beaten to a paste with juice of some betel leaves. Both these vegetables should not be less than three years old. The diamond is enclosed within this paste and roasted in a pit of fire. The process is repeated seven times, when the stone is easily reduced to a fine powder. Another process consists in roasting the diamond enclosed in a paste made of horn-shavings, for three times in succession. The diamond thus prepared is said to be a powerful alterative tonic that improves nutrition, increases the strength and firmness of the body, and removes all sorts of disease. Dose about one grain."

SPECIAL OPINION.—§ "Employed as a poison, it is administered in the shape of dust, as in the late celebrated case when the Resident of Baroda, Sir Arthur Phayre, nearly lost his life" (*Surgeon Major J. E. T. Aitchison, Simla*).

DIANTHUS, *Linn.; Gen. Pl., I., 144.*

Dianthus Caryophyllus, *Linn.; Fl. Br. Ind., I., 214.* 377

THE CLOVE PINK and CARNATION.

Habitat.—In the *Flora of* [illegible] Attok, is mentioned [illegible]

The Pi[illegible] in gardens especially [illegible] and *D. chinensis, Linn.*, is practically a naturalised weed of cultivation, springing up in native gardens from self-sown seed, all over the plains. The young flower-buds of these plants, from their resemblance to a nail (*Clou, Fr.; Clout, Eng.*), were early known as Cloves, and the leaves being like those of a Clove obtained the name CARYOPHYLLUS from their cutting the hand and giving origin to [illegible]. The cloves of modern commerce by a play on these names became *Caryophyllus aromaticus*, which see, Vol. II., p. [illegible].

Diaphoretics, see Medicine.

DICHOPSIS, *Thw.; Gen. Pl., II., 658.* 378

A genus of trees [illegible] the Malay peninsula and [illegible] by Sir J. D. Hooker [illegible]

India-rubber—is obtained from several widely different plants, Gutta-percha proper is only obtained from the Sapotacea family and mostly from one or two species of DICHOPSIS; the inferior forms obtained from other plants can at most be called Gutta-percha substitutes.

379

Dichopsis elliptica, *Benth.; Fl. Br. Ind., III., 542;* SAPOTACEÆ.

Syn.—BASSIA ELLIPTICA, *Dalz.;* ISONANDRA ACUMINATA, *Drury, Useful Plants (not of Gardner).*

Vern.—*Panchoti palu*, BOMB.; *Panchoti pala*, TAM.; *Panchonta*, KAN.

References.—*Beddome, Fl. Sylv., t. 43; Gamble, Man. Timb., 242; Dalz. & Gibs., Bomb. Fl., 130; Cleghorn, Memorandum on Panchotee or the Indian Gutta tree; Drury, U. Pl., 260; Lisboa, U. Pl. Bomb., 90; Cooke, Oils and Oilseeds, 8; Balfour, Cyclop., I., 289; II., 387; Indian Forester, III., 24; VIII., 208; Kew Report for 1881, p. 44; Man. Coimbatore Dist., 41; Madras Man. of Administ., Vol. II., 105; Tropical Agriculturist, 1883, p. 960.*

Habitat.—A large tree of the Western Ghâts, extending from Bombay to Kanara, and ascending to an altitude of 4,000 feet. Beddome says it is a common tree in all the moist sholas of the Western Ghâts, also in the Wynaad, Coorg, Travancore, &c.

GUM. 380

Gum.—This tree yields the Indian Gutta-percha or *pálá* gum, a substance which has attained a certain amount of popularity as an adulterant for Singapore Gutta. It is stated that as much as 20 to 30 per cent. may be used without the characteristic properties of the Gutta-percha being destroyed. To Mr. Lascelles and General Cullen should be attributed the honour of having brought this substance prominently before the public; the latter gentleman recommended, amongst many other uses, its adaptability as a cement. Balfour describes the juice as obtained on tapping the trees—a process quite different from that resorted to in the Malay Peninsula with Gutta-percha. The following passage from *Drury's Useful Plants of India* gives a full account of this substance:—

"The exudation from the trunk, which has some similarity to the gutta-percha of commerce, is procured by tapping, and the quantity is not inconsiderable; but it would appear that the tree requires an interval of rest of some hours, if not days, after frequent incision. 'In five or six hours,' says General Cullen,' 'upwards of 1¼lb (more than a catty) was collected from four or five incisions in one tree.' Again, he writes in the same month (April): 'Incisions were made in forty places, at distances nearly 3 feet apart, along the whole trunk. The quantity produced was 2½ *dungalies* (a *dungaly* is about half a gallon), the reeds were placed again, but in the evening no more milk was found; but the bark is thin, and the juice soon ceases to flow, although there is plenty of it in the tree.' The gum when fresh is of a milky white colour, the larger lumps being of a dullish red. Specimens of the gum were forwarded to England to be reported on by competent persons, and on an analysis of its properties, Messrs. Teschemachar & Smith stated: 'It is evident that this substance belongs to the class of the vegetable products of which caoutchouc and gutta-percha are types, and that it greatly resembles 'bird-lime' in its leading characteristics, but in a higher degree. It is evident that, for water-proofing purposes, it is (in its crude state) unfit; for, although the coal-tar, oil of turpentine paste, might be applied to fabrics, as similar solutions of caoutchouc now are, and a material obtained impervious for a time to wet, yet that, owing to the capacity of this substance to combine with water and become brittle in consequence at ordinary temperatures, such a water-proofed fabric would become useless very quickly. We do not of course in any way imply that, in the hands of some inventors, this and other difficulties to its useful application may not be over-

come Although unfit for waterproof clothing, moveable tarpauling, and the like, yet it might be usefully employed to waterproof fixed sheds, or temporary erections of little cost covered with calico or cheap canvas, but there are already a numerous class of cheap varnishes equally adapted for such a purpose, so that as a waterproofing material, it is but advisable, for the present, to look upon it as useless

GUM

"Its perfume when heated might possibly render it of some value to

made available by the game-
iking vermin and small birds,
pheasant could free itself, if

r is hard and not
nuch employed by
urniture

OIL. 381

TIMBER. 382

Dichopsis Gutta, *Bth & Hook f, Fl Br Ind, III, 543*

383

GUTTA-PERCHA

Syn —ISONANDRA GUTTA, *Hook*

Vern —*Niatu, taban,* MALAY

References —*Brandis, For Fl, 286, Gamble, Man Timb, 242, Christy, Com Pl ... Bai*

Habitat —A tree ...

... as actually taken place.

Gum.—This is said to afford the best quality of Gutta-percha. The following brief abstract will be found to set forth the main facts known regarding this substance, and to exhibit the plants which either yield the commercial article or which might be utilised as substitutes Most of these are either grown in India or might easily be introduced

GUM 384

Oil —The oil from this plant was reported on by the Madras Jurors at

OIL 385

the Exhibition of 1857. A vegetable butter is said in Sumatra to be prepared from the seeds.

TIMBER. 386

Structure of the Wood.—Soft, fibrous, spongy, of a pale colour, and marked with black lines.

387

GUTTA-PERCHA.

References.—*Kew Report for 1881 gives a long account of Gutta-percha, which has been freely consulted in drawing up the present abstract; Spons' Encyclopædia; Journal of the Agri. Hort. Soc.; Government of India Proceedings; Baden Powell, Panjab Products; Indian Forester, Vol. VIII., 205-209; Encyclopædia Britannica, Vol. XI.; Tropical Agriculturist (numerous articles in the volumes for the past four or five years); British Manufacturing Industries (Stanford's series) by Collins; Society of Arts for 1844; Dr. Montgomerie's Lecture on the Discovery of Gutta-percha; Balfour, Cyclopædia of India; M. C. Naudin, in Bulletin, Minist. de L'Agri., Paris, Dec. 1888, &c., &c.*

A commercial term for the inspissated milky sap of several plants, of which nearly all (or at least all the important ones) belong to the natural order SAPOTACEÆ. The word gutta-percha is of Malayan origin; it signifies the gum or *gutta* of the tree known as *percha*. The gutta-percha of commerce is, however, chiefly the *gutta-taban* or Dichopsis Gutta, a tree of Perak. As it reaches the market the gum is largely adulterated, often consisting of the inspissated saps of some five or six different plants mixed together, of which a fig and a bread fruit tree, which yield inferior India-rubbers, are probably the most frequently used. Gutta-percha seems to have come into commercial notice in Europe in the year 1845 (from the Straits), its important uses soon causing an immense demand. It was probably known as *mazer-wood* at a much earlier date, and in 1822 Dr. W. Montgomerie experimented with it, and in 1844 read a paper on the subject before the Society of Arts, London. From that date it became a regular article of commerce. It is principally employed in coating telegraphic cables, owing to its being a perfect insulator, while it is of such a nature as to withstand, in a remarkable degree, the action of water. It is in fact much more durable when entirely submerged than when exposed to a moist atmosphere. About 10 years have been stated to be the period it will withstand the variations of climate in the air; 20 years if enclosed in iron tubes; but 20 years, when it has been submerged, have no appreciable effect upon the article. This is due to the fact that under the influence of light and air it slowly becomes oxidised, being converted into a brittle resin soluble in hot alcohol. This is the great defect of Gutta-percha, for, when oxidised, it loses its plastic nature. Under water and at great depths in the sea, it is, however, very durable, hence its value as an insulator for submarine cables. Chemically, gutta-percha is almost identical with India-rubber, but it differs physically, being tough and inelastic.

Since the date Gutta-percha was made known to Europe, perhaps no substance has developed more rapidly, and, with India-rubber, its uses may be said to be so many and so important as to make it perfectly indispensable to commerce.

The immense demand has caused an extended enquiry all over the globe with the view of expanding the field of supply or discovering substitutes in sufficient abundance likely to meet the demand without endangering the extermination of the supply of plants. As far as Gutta-percha is at present concerned, there cannot be a doubt but that a few years more will suffice to eradicate the supply from the Straits Settlements. It has been estimated that to meet the shipments of gutta-percha from Sarawak alone during the years 1854-75 over 3,000,000 trees were felled. Great Britain imported in 1880 from the Straits Settlements 62,862 cwt. of gutta-percha, valued at £505,821. The expansion of the trade may be said

Inspissated Sap.

to be demonstrated by the fact that in 1876 the imports were only 19,665 cwt, but were two years later 49,387 cwt. The present total annual trade in gutta-percha has been estimated at 10,000,000lb. The future prospects [illegible]

[illegible]

6d. a lb

Another interesting feature, which the increasing demand for Gutta-percha must solve, is the possibility (in a simple way) of transforming the [illegible]

[illegible]

tive alphabetical places in this work. The following abstract may, however, prove useful:—

1. Achras Sapota, *Linn*; SAPOTACEÆ. (*See Vol. I., A., No. 376, page 80.*)

[illegible]

[illegible] (*See Vol. I., A., No. 672, page 198.*)

One of the many forms of this tree has recently been discovered to be the source of the *Gutta-pulei* of Singapore. The *Satian* has long been known in India as yielding an inferior India-rubber, but it is doubtful if this could be regarded as anything more than an adulterant for Gutta-percha

3 Bassia Mottleyana, *De Vriese*, SAPOTACEÆ. (*See Vol. I., B., No. 281, page 416*)

A tree of Malacca and Borneo, known in the vernacular as *kotian*. Mr. Mottley says that this tall and straight tree, when wounded, yields a copious flow of milky [illegible] softened by heat.

4. Calotropis [illegible] 171, page [illegible]

The *madar* or *akanda*, a plant scarcely to be distinguished from the following species, the properties and uses of which are identical, and these plants may therefore be discussed jointly. C. gigantea is most abundant in the Lower Provinces and Eastern India, while C. procera is the species chiefly met with in Upper or Northern and Central India.

pissated Sap.

5. **Calotropis procera**, *R. Br.*

Reference.—*Agri-Hort. Soc. Ind., VIII., 107, 226, 231.*

The inspissated and sun-dried milky sap from the stem resembles Gutta-percha. The *madar* is, in fact, the most interesting and most hopeful plant not belonging to the natural order SAPOTACEÆ, which can be said to yield a substance resembling Gutta-percha ever likely to obtain a commercial reputation as a Gutta-percha substitute. Mr. **Liotard** publishes, in his Memorandum on the Materials in India suitable for the Manufacture of Paper, the opinion of **Professor Redwood** upon *Madar-gutta*. The Professor considers that it possesses many properties in common with the Gutta-percha of commerce. The specimen so reported upon was collected by **Captain G. E. Hollings**, Deputy Commissioner, Shahpur (in the Panjáb) in the year 1853, little more than one year after the date of the original discovery of this Gutta. We have learned nothing further in 30 years, and uncountable riches of fibre and gum may have all the while been wasting along every roadside and over every rubbish heap.

6 **Dichopsis elliptica**, *Benth.*; SAPOTACEÆ.

The *pauchoti*, a large tree of the Western Ghâts; yields the Indian gutta-percha.

7. **D. Gutta**, *Benth. & Hook.*

It is said that the finest quality of all the guttas is the *Gutta-susu*, obtained from a botanically undetermined plant. This is very scarce, but the best commercial quality is that obtained from **D. Gutta**.

There are two forms, one with red flowers known as *tuban-merut*, and the other with white flowers, *tuban-patch*. The young trees require shade and a rich well-drained soil, hence the preference for hill-sides. No special period is observed for collecting the gutta, but it is said to be generally collected at the close of the rains. Full-grown trees, say, 20 years old, are hewn down and tapped all along at distances of 18 inches. The yield is so variously stated that it does not seem desirable to quote the contradictory reports. A mistake seems often to have been made between the yield of sap, the yield of fresh gutta-percha, and the yield of dry gutta-percha. The weight of sap would of course be far greater than that of gutta-percha, and on drying the commercial article loses as much as 30 per cent. of its weight. It seems probable that the yield of dry gutta-percha per tree may average from 2 to 14lb. The sap is of course drawn from the middle layer of the bark, the region of laticiferous vessels. The fresh milk or latex appears under the microscope as an emulsion, a clear liquid having in it minute globules of caoutchouc. It is supposed that the caoutchouc is held in suspension in the juice through the agency of ammonia. At all events, many of the fresh milky saps like that of gutta-percha have an ammoniated odour and the addition of a little ammonia prevents the natural coagulation due to evaporation. The value of a Gutta-percha or India-rubber depends on the proportion of caoutchouc granules which it contains and on the relative absence of certain oxidised, viscid, resinous substances, soluble in alcohol. The formation of such materials is greatly prevented by a rapid evaporation of the milk. The crude sap, if in small quantities, may be concreted by rubbing between the hands, but it is more expeditiously accomplished by boiling.

Singapore and Penang are the chief collecting depôts.

8. **D. obovata**, *Clarke.*

An evergreen tree of Tenasserim, extending to Malacca and Penang. According to Kurz it yields gutta-percha.

9. **D. polyantha**, *Benth.*

Vern.—*Tali*, BENG.; *Sill-kurta*, CACHAR.

Milky Saps.

A tree, 30 to 40 feet in height, occurring in Sylhet, Chittagong, and Pegu Kurz remarks that it produces a good quality of gutta-percha in large quantities

10 Gutta Sundek, the second best commercial form of gutta-percha, is at present un-identified It occurs abundantly in the Malay Peninsula. M. Beauvisage named it as Keratephorus Leerii, *Husk*, but the Kew authorities regard this as incorrect, and Dr. Trimen, who, in the Ceylon ... g seedlings, thinks it

12 D. laxiflora, *Hook f.*

Trees which inhabit the forests of Malacca, Singapore, and Sumatra They are said to yield the *gutta-jelutong* of commerce, a form of India-rubber

13 Euphorbia trigona, *Haworth*; EUPHORBIACEÆ

Syn —E CATTIMANDOO, *Elliot*; *Fl Br Ind*, *V*, 256

Vern.—*Katimandu*, TAM

Syn —E LIGULARIA, *Roxb*; *Fl Br Ind*, *V*, 255.

Vern —*Mansa sij* or *Sij*

Yields a milky sap which, on drying, much resembles gutta percha, and for which there seems every probability of its being used as a substitute See a long account of the properties of this gutta-percha in the

the preparation of gutta-percha.

16 ... *Plants*) ... mployed ... efly from ... upon its

resemblance to gutta percha

17. E Tirucalli, *Linn*; *Fl Br Ind*, *V.*, 254

Vern —*Lanka sij*, BENG, *Sehud*, HIND, *Tiru kalli*, MAL, *Sha soung-lekhyo*, BURM

A small tree cultivated throughout India and used as a hedge.

gutt ...
Brit ...
to al ...
mer ...
sap, obtained from it, was a ...
was employed in the p ...
which date a considerable ...
Agriculturist, 1883, *p* 959 ...
Soc of Arts, *Feb* 26*th*, *an* ...
Agri, *Paris*, *Dec* 1888.

GUM.

19. **Payena Maingayi**, *C.B.C.*; SAPOTACEÆ.

A tree of Malacca and Penang, said by Maingay to abound in gutta-percha; also **P. Leerii**, from which it is stated the *Gutta-Sundek* is obtained.

388

Dichopsis Helferi, *Clarke; Fl. Br. Ind., III., 542.*

Habitat.—A closely allied tree to **D. obovata**, and may be the plant referred by **Kurz** to that species. It is a native of Tenasserim and Tavoy.

GUM. 389

Gum.—Is reported to yield a good quality of Gutta-percha.

390

D. obovata, *Clarke; Fl. Br. Ind., III., 542.*

Syn.—ISONANDRA OBOVATA, *Griff.*

References.—*Kurz, For. Fl. Burm., II., 120; Balfour, Cyclop., II., 387.*

Habitat.—A large tree which **Kurz** says occurs in the Tropical forests of Tenasserim, but to which the *Flora of British India* assigns the habitat of Malacca and Singapore, remarking that imperfect specimens of what appears to be the plant were collected by **Falconer** at Moulmein.

GUM. 391

Gum.—Kurz writes that it yields a fair sort of Gutta-percha.

392

D. polyantha, *Benth. and Hook. f.; Fl. Br. Ind., III., 542.*

Syn.—BASSIA POLYANTHA, *Wall*; ISONANDRA POLYANTHA, *Kurz (ii., 119).*

Vern.—*Táli*, BENG.; *Sill-kurta*, CACHAR; *Thainban*, MAGH.

References.—*Gamble, Man. Timb., 242; Ind. Forester, IX., 427; XI., 319.*

Habitat.—A moderate-sized evergreen tree, met with in Cachar, Chittagong, and Arakan.

GUM. 393

Gum.—**Kurz** says it produces a good quality of Gutta-percha in large quantities—probably little inferior to that of Singapore. The Conservator of Forests, Assam, in a letter to the Inspector General, dated 10th November 1884, reported that this tree was well known to the people of Cachar and Sylhet, but although he had "often asked the people about its yielding Gutta-percha," he had "never heard of it being extracted or made use of, except that it is mixed sometimes with India-rubber, and in doing so the people of course sell themselves, as they always get much less for mixed rubber than for pure. I have referred the matter to the Deputy Commissioner of Sylhet and the Cachar Forest Officer to make sure." "I have ordered the Cachar Forest Officer to make an experiment to ascertain how much a tree will yield and to let me have the stuff collected to allow of its being valued.

"The following is the result of the above experiment, but the writer has not been able to discover the report, if obtained, of the commercial value of the Gutta-percha collected in Cachar:—

Yield. 394

"I had 36 trees tapped, giving a yield of 15 pounds of dry Gutta-percha. To ascertain the yield per tree I have recorded the yield of six trees, the tapping of which was personally superintended by me. The milk was weighed directly it was taken from each tree separately. Then the whole was boiled down in an iron pan over a slow fire. The result is that 6 seers 11 chattacks of milk yielded 2½ seers of Gutta-percha or [illegible] third the weight of milk." The Forest Officer seems thus to have tapp[illegible] the trees after the same manner as with India-rubber trees, whereas in [illegible] Gutta percha-producing regions the trees are felled. It is probable th[illegible] a much larger yield would have been obtained had the Straits method been followed. This is not however mentioned by way of recommending the destructive system of felling the trees, but only to prevent unfavourable comparisons being drawn as to the yield.

It does not appear how often the trees were tapped, in other words whether they yielded all that it was possible for them to do At the same time the above experiment is instructive each tree having on an average yielded a little over 2 seers of milk one third of which consisted of Gutta percha The average yield of true Gutta percha from the felled trees has been variously stated, but it may be said to vary from 2, 4 to 7lb per tree the maximum recorded yield being 25lb according to some writers, 50

Milky Saps.

FOOD
Flowers.
395
TIMBER.
396

tagong Mann says it does not float,
green wood Major Lewin remarks tl
making beds tools &c., and is sawn intc
For further information regarding Gutta percha see INDIA RUBBER

DICHROA, *Lour*, *Gen Pl*, *Vol I*, *641*

397

Dichroa febrifuga, *Lour*, *Fl Br Ind*, *Vol II*, *406*, SAXIFRAGACEÆ

MEDICINE
Shoots
398
Bark
399
TIMBER.
400
DOMESTIC.
401

rel gious ceremonies

DICHROSTACHYS, *DC*, *Gen Pl*, *I 592*

402

Dichrostachys cinerea, *W. & A*, *Wight Ic t 357*, *Fl Br Ind*, *II*, *288*, LEGUMINOSÆ

(accord ng to Ainslie), SANS

References —*Roxb Fl Ind*, *Ed C B C*, *422 Brandis, For Fl 171 Beddome Fl Sylv t clxxxv Gamble, Man Timb 148 Thwaites En Ceylon Pl*, *99 Dalz & Gibs Bomb Fl 84 Aitchison Cat Pb and Sind Pl*, *53 Sir W Elliot Fl Andh 40 131 190 91, W & A Prod (864) p 278 Ainslie, Mat Ind*, *II 453 Drury, U Pl*, *181*,

GUM.

19. **Payena Maingayi**, *C.B.C.*; SAPOTACEÆ.

A tree of Malacca and Penang, said by Maingay to abound in gutta-percha; also **P. Leerii**, from which it is stated the *Gutta-Sundek* is obtained.

388

Dichopsis Helferi, *Clarke; Fl. Br. Ind., III., 542.*

Habitat.—A closely allied tree to **D. obovata**, and may be the plant referred by Kurz to that species. It is a native of Tenasserim and Tavoy.

GUM. 389

Gum.—Is reported to yield a good quality of Gutta-percha.

390

D. obovata, *Clarke; Fl. Br. Ind., III., 542.*

Syn.—ISONANDRA OBOVATA, *Griff.*

References.—*Kurz, For. Fl. Burm., II., 120; Balfour, Cyclop., II., 387.*

Habitat.—A large tree which Kurz says occurs in the Tropical forests of Tenasserim, but to which the *Flora of British India* assigns the habitat of Malacca and Singapore, remarking that imperfect specimens of what appears to be the plant were collected by Falconer at Moulmein.

GUM. 391

Gum.—Kurz writes that it yields a fair sort of Gutta-percha.

392

D. polyantha, *Benth. and Hook. f.; Fl. Br. Ind., III., 542.*

Syn.—BASSIA POLYANTHA, *Wall;* ISONANDRA POLYANTHA, *Kurz (ii., 119).*

Vern.—*Tâli,* BENG.; *Sill-kurta,* CACHAR; *Thainban,* MAGH.

References.—*Gamble, Man. Timb., 242; Ind. Forester, IX., 427; XI., 319.*

Habitat.—A moderate-sized evergreen tree, met with in Cachar, Chittagong, and Arakan.

GUM. 393

Gum.—Kurz says it produces a good quality of Gutta-percha in large quantities—probably little inferior to that of Singapore. The Conservator of Forests, Assam, in a letter to the Inspector General, dated 10th November 1884, reported that this tree was well known to the people of Cachar and Sylhet, but although he had "often asked the people about its yielding Gutta-percha," he had "never heard of it being extracted or made use of, except that it is mixed sometimes with India-rubber, and in doing so the people of course sell themselves, as they always get much less for mixed rubber than for pure. I have referred the matter to the Deputy Commissioner of Sylhet and the Cachar Forest Officer to make sure." "I have ordered the Cachar Forest Officer to make an experiment to ascertain how much a tree will yield and to let me have the stuff collected to allow of its being valued.

"The following is the result of the above experiment, but the writer has not been able to discover the report, if obtained, of the commercial value of the Gutta-percha collected in Cachar:—

Yield. 394

"I had 36 trees tapped, giving a yield of 15 pounds of dry Gutta-percha. To ascertain the yield per tree I have recorded the yield of six trees, the tapping of which was personally superintended by me. The milk was weighed directly it was taken from each tree separately. Then the whole was boiled down in an iron pan over a slow fire. The result is that 6 seers 11 chattacks of milk yielded $2\frac{1}{3}$ seers of Gutta-percha or one-third the weight of milk." The Forest Officer seems thus to have tapped the trees after the same manner as with India-rubber trees, whereas in the Gutta percha-producing regions the trees are felled. It is probable that a much larger yield would have been obtained had the Straits method been followed. This is not however mentioned by way of recommending the destructive system of felling the trees, but only to prevent unfavourable comparisons being drawn as to the yield.

It does not appear how often the trees were tapped, in other words, whether they yielded all that it was possible for them to do. At the same time the above experiment is instructive, each tree having on an average yielded a little over 2 seers of milk, one-third of which consisted of Gutta-percha. The average yield of true Gutta-percha from the felled trees has been variously stated, but it may be said to vary from 2, 4 to 7lb per tree, the maximum recorded yield being [illegible] according to some writers, 20 according to others, and even 100 is given by one author. This seems highly improbable. (See the remarks, p. 108, regarding mistakes of yield arising from the milk being spoken of in some reports, in others the fresh rubber, in a third the dried rubber.)

MILKY SAPS.

Food.—The FLOWERS are said to be eaten.

FOOD. Flowers. 395

Structure of the Wood.—Red, hard, much valued in Cachar and Chittagong. [illegible] says it does not float, but he is probably referring to green wood. Major Lewin remarks that it is used in Chittagong for making beds, tools, &c., and is sawn into boards for the Calcutta market. For further information regarding Gutta percha see [illegible].

TIMBER. 396

DICHROA, [illegible]

[illegible]

Dichroa febrifuga, [illegible]

397

Syn.—[illegible]

Vern.—[illegible]

In an interesting report on the [illegible] Dr. [illegible] gives the above so-called [illegible] names for this plant, and [illegible]

References.—[illegible]

Habitat.—An evergreen shrub, common in the forests of the Eastern Himálaya (5,000 to [illegible] feet), from Nepal to Bhutan, and in the Khasia Hills, above 4,000 feet.

Medicine.—The [illegible] and the BARK of the roots are made into a decoction and used as a febrifuge by the Nepalese (Gamble). Dr. [illegible] says this drug is given in cases of fever [illegible].

MEDICINE. [illegible] Bark. [illegible]

Structure of the Wood.—White, moderately hard, with small pores and moderately broad, to very fine medullary rays.

TIMBER. [illegible]

Domestic Uses.—Employed by the Bhutias and Lepchas to [illegible] religious ceremonies.

DOMESTIC. [illegible]

DICHROSTACHYS, [illegible]

Dichrostachys cinerea, [illegible]

[illegible]

Syn.—[illegible]

Vern.—[illegible]

References.—[illegible]

D. [illegible]

Royle, Ill. Him. Bot., 182; Liotard, Dyes, 33; Watson's Report, 18; Balfour, Cyclop., 946; Raj. Gaz., 29; Indian Forester, Vols. III., 202; IV., 232; VIII., 30; XI., 456; XII., 33; App., 2; Gazetteer, N.-W. P. (Bundelkhand), Vol. I., 80; (Agra), Vol. IV., LXXI.

Habitat.—A thorny shrub or small tree of the dry, stony hills of the N.-W. Provinces, Western and Central India, Rajputana, Madras, Ceylon, &c. Distributed to the Malay Islands, Northern Australia. Doubtfully distinct from **D. nutans**, a native of Tropical Africa.

GUM. 403

Gum.—It is said to yield a gum, but of this nothing is known.

DYE. 404

Dye.—The lac insect is often found on the tree.

FIBRE. 405

Fibre.—**Mr. J. W. Cherry** of Salem, Madras, sent to the Calcutta International Exhibition a sample of a yellowish white good bast fibre which was said to have been obtained from this plant.

MEDICINE. Shoots. 406

Medicine.—The young SHOOTS are bruised and applied to the eyes in cases of ophthalmia.

FODDER. 407

Fodder.—The leaves are mixed with corn and given to riding horses (*Ainslie*). It is supposed to free them from both *bots* and worms.

TIMBER. 408

Structure of the Wood.—Heartwood red, extremely hard; weight 70 to 80lb a cubic foot. Used for walking-sticks. It is, however, too small to be of much use, but is much valued for tent pegs.

DICLIPTERA, *Juss.; Gen. Pl., II., 1120.*

Several species of this genus are alluded to in the Gazetteers and other descriptive works on India. Some are cultivated in gardens, while others are referred to as wild. (*See Agra Gazetteer*, p. lxxvi; Sir W. Elliot's *Flora Andhrica*, pp. 38 and 183, for **D. parvibracteata**, the *Chiku velaga* of Telegu; Stewart's *Account of Hazara*, where **D. Roxburghiana** is said to be one of the more remarkable of the herbaceous plants (also *Bundelkhand Gazetteer*, p. 83, &c., &c.).

409

Dicliptera Roxburghiana, *Nees, Fl. Br. Ind., IV., 553;* ACANTHACEÆ.

Vern.—*Kirch, somni, lakshmana* (bazar name), PB.; *Bouna*, SIMLA.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 42; Voigt, Hort. Sub. Cal., 492; Dalz. & Gibs., Bomb. Fl., 196; Aitchison, Cat. Pb. and Sind Pl., 113; Atkinson, Him. Dist., 373; Balfour, Cyclop., 946.*

Habitat.—According to the *Flora of British India* there are two forms of this plant— the one met with on the plains of India, the other on the hills. Regarding the former there seems little doubt, but with the latter it is quite otherwise. It is the hill plant alone which requires to be dealt with in this work, and this fact has necessitated the writer's examining the specimens in his private herbarium with as much care as the time at his disposal would admit of. A sample of the plant collected at Simla was by him sent to the authorities of the Royal Herbarium, Kew, the result being that it was pronounced "**Dicliptera Roxburghiana**, *Nees*, var.?" Presumably, it may be the plant described in the *Flora of British India* as var. **bupleuroides** (*sp. Nees in Wall., Pl. As. Rar., III., p. 111*). The writer would be more disposed, however, to place the Simla plant in another genus than to amalgamate it with **D. Roxburghiana**. The following are the chief characteristics of the two plants as recognised by the writer:—

410

a **D. Roxburghiana**, *Nees.*

Syn.—This is apparently not the **Justicia chinensis**, *Linn.*, as described by **Roxburgh**, since that plant is said to have, among other distinctive characters, cordate leaves.

A tropical species, specimens of which in the writer's herbarium are in flower, and dated February to May. Leaves with a short petiole (¼ to ½ inch), nearly glabrous.

Flower clusters, sessile, bracts obovate apiculate *tricostate* Fruit long, flattened in *the plane of the septum*, on dehiscence severing into two valves, each with a portion of the ruptured septum down the middle which is seen to support the seeds

β D bupleuroides, *Nees* (the Simla plant) 411

in /
hai
one
ang
valves and rising up ejects the seeds as in Rungia

Medicine —The drug sold in Upper India under the name of *laksmana* is the form β It is said to be a useful tonic. MEDICINE. 412

DICOMA, *Cass*; *Gen Pl.*, *II*, *492*

Dicoma tomentosa, *Cass*, *Fl Br Ind*, *III*, *387*, COMPOSITÆ. 413

Vern —*Navananji cha pala*, BELGAUM

References —*Dals & Gibs*, *Bomb Fl*, *181*, *Aitchison*, *Cat Pb and Sind Pl*, *81*, *Royle*, *Ill Him Bot*, *248*, *Indian Forester*, *XII*, *app 15*

Habitat —An herb or low shrub, with the branches clothed with white, cottony wool It is met with in North-West India, the Western Peninsula, and Sind to Ava

Medicine —Dr. Peters of the Bombay Medical Service has kindly favoured the writer with a note on the medicinal uses of this plant It is, he writes, an agreeable strong bitter, used in Belgaum as a febrifuge, especially in the febrile attacks to which women are subject after child-birth MEDICINE. 414

DICTAMNUS, *Linn*, *Gen Pl*, *I*, *287*

Dictamnus albus, *Linn*, *Fl Br Ind*, *I.*, *487*, RUTACEÆ. 415

Syn —D FRAXINELLA, *Pers*, D HIMALAYANUS, *Royle*, *Ill*, *156*, *t 29*

References —*U S Dispens*, *15th Ed*, *1634*, *Royle*, *Ill Him Bot*, *156*, *t 29*

Habitat —A strong smelling shrubby plant, met with on the temperate Western Himalaya from Kashmir to Kunawar (6,000 to 8,000 feet), very

MEDICINE. 416

termittent fever, amenorrhœa, hysteria, &c The writer has repeatedly been told by the hill people that the plant was used medicinally, but could never discover for what purpose

DIDYMOCARPUS, *Wall*, *Gen Pl*, *II.*, *1021* [GESNERACEÆ.

Didymocarpus aromatica, *Wall*, *Fl Br Ind*, *IV*, *347*, 417

Vern —*Kumkuma*, HIND, *Kumkuma*, *ramgovindhi* NEPAL.

References —*Thwaites*, *En Ceylon Pl*, *207* *O Shaughnessy*, *Beng Dispens*, *478*, *Atkinson*, *Him Dist*, *368*, *Royle*, *Ill Him Bot*, *294*

Habitat —A succulent herbaceous plant, met with in Nepál and Kumaon

Perfumery —The whole plant is said to be used as a perfume No subsequent author has alluded to this fact since Wallich first made it known, and it may therefore be added as a caution against possible errors that the word *Kum-kuma* is the Sanskrit for saffron (Crocus sativa) PERFUMERY. 418

MEDICINE. 419

Medicine.—Wallich wrote that it was used in Nepál as an aromatic medicine, but Dr. Gimlette, who furnished the writer with a most interesting collection of the Nepál medicinal plants, was apparently unacquainted with this drug, from which circumstance it may at least be assumed to be unimportant.

DIGERA, *Forsk; Gen. Pl., III., 28.*

420

Digera arvensis, *Forsk.; Fl. Br. Ind., IV., 717; Wight, Ic., t. 732;* AMARANTACEÆ.

Syn.—D. MURICATA, *Mart.*

Vern.—*Luta mahawria, gungatiya,* BENG.; *Kari gandhari,* SANTAL; *Das,* BIJNOR; *Tartara, tandala, leswa,* PB.; *Tandala,* SIND; *Getan,* BOMB.; *Chenchali kúra, chanchali kúra,* TEL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 226; Voigt, Hort. Sub. Cal. 114; Thwaites, En. Ceylon Pl., 249; Dalz. & Gibs., Bomb. Fl., 218.; Stewart, Pb. Pl., 182; Aitchison, Cat. Pb. and Sind Pl., 129; Flora Andhrica by Sir Walter Elliot, 34, 36; Dymock, Mat. Med. W. Ind., 2nd Ed., 889; Murray, Pl. and Drugs, Sind, 102; Lisboa, U. Pl. Bomb., 361; Atkinson, N.-W. P. Econ Prod., Pt. Foods, 91, 97; Indian Forester, XII., App. 20.*

Habitat.—A small annual herb of the plains of Bengal and North-West India, South Deccan, Concan, Mysore, and the Carnatic, to Peshawar and the Salt Range. Distributed on the one side through Burma to Ceylon, and on the other to Beluchistan, Afghanistan, Arabia, and Africa.

FOOD. 421

Food.—It serves as a pot-herb. Leaves and tender tops are also used by the natives in their curries.

FODDER. 422

Fodder.—Used as fodder in South Baluchistan.

423

Digitaria.—A genus of grasses, the species of which have been reduced to Panicum, *Linn.* Several species are alluded to as met with in the Banda District, and D. sanguinale (Panicum sanguinale, *Linn.*) is specially alluded by Stewart in his account of Hazara.

Dikamali (or Decamali) Resin; see Gardenia lucida, *Roxb.*

Dilivaria ilicifolia, *Nees;* see Acanthus illicifolia, *Linn.*; ACANTHACEÆ; [*Vol. I., A., No. 324.*

Dill, see Peucedanum graveolens, *Benth.*; UMBELLIFERÆ.

DILLENIA, *Linn.; Gen. Pl., I., 13.*

424

Dillenia aurea, *Smith; Fl. Br. Ind., I., 37;* DILLENIACEÆ.

Syn.—D. ORNATA, *Wall.;* D. SPECIOSA, *Griff., Notul. IV., 703;* COLBERTIA OBOVATA, *Blume.*

Vern.—*Dheugr,* NEPAL; *Chamaggai,* N.-W.P.; *Byúben* (*sen-bwon,* according to Mason), BURM.

References.—*Brandis, For. Fl., 2; Kurz, For. Fl. Burm., I., 20; Gamble, Man. Timb., 3; Mason, Burma and Its People, 408, 532, 741.*

Habitat.—A large tree of Nepál, Bhután, Bengal, Burma, and the Andaman Islands; distributed to Java, Borneo &c. Mason speaks of this tree at Maulmain as being highly ornamental. The visitor in February, he says, has "his attention arrested by a tree without leaf, but covered with large gaudy yellow flowers."

TIMBER. 425

Structure of the Wood.—Grey, beautifully mottled, hard, close-grained; weight from 45 to 49lb a cubic foot.

426

D. bracteata, *Wight, Ic., t. 358; Fl. Br. Ind., I., 37.*

Syn.—D. REPANDA, *Roxb., Fl. Ind., Ed. C.B.C., 452;* WORMIA BRACTEATA, *Beddome, t. 115.*

Habitat —A handsome tree of the Western Peninsula, especially at Mysore and Coimbatore.

Properties and Uses —Practically the same as those recorded under the other species

USES 427

Dillenia indica, *Linn*, *Fl Br Ind*, *I*, *36* 428

Syn —D. SPECIOSA and ELLIPTICA, *Thunb*, *Beddome*, *t 103*

Vern —*Chalta*, HIND, *Chalta, hargesa* BENG, *Korkot*, SANTAL, *Chilta*, MONGHYR; *Panpui*, GARO, *Chalita, otengah*, ASSAM, *Rai, oao*, URIYA, *Ramphal*, NEPAL, *Phamsikol*, LEPCHA, *Thapru, chauralesi*, MAGH, *Mothe karamala, mota karmel, karambel* BOMB, *Mota karmal, karmbel*, MAR, *Uva*, TAM, *Uva, pedda kalinga* (*kalinga*, Elliot), TEL, *Bettakanagala, kadkanagula* KAN, *Syalita*, MALAY, *Thabyu*, BURM, *Carllow* TALEING, *Hondapara*, SING, *Bhavya* (according to Dutt), *ruvya* (Birdwood), SANS

References —*Roxb*, *Fl Ind*, *Ed C B C*, *451* *Brandis*, *For Fl I*,

People of Assam

Silk worm 429

leaves

Medicine —The JUICE of the fruit, mixed with sugar and water, is used as a cooling beverage in fevers, and as a cough mixture The BARK and the LEAVES are astringent and are used medicinally The FRUIT is slightly laxative but is apt to induce diarrhœa if too freely indulged in (*Roxburgh*, *Royle Drury*, &c)

MEDICINE Juice 430 Bark 431 Leaves 432 Fruit 433

Food —The fruit is large, about 3 inches in diameter, and is sur

FOOD 434

Structure of the Wood —Red with white specks, close-grained, moderately hard It is used to make helves and gunstocks, and in construction, and is said to be durable under water It makes good fire-wood and charcoal Weight 40 to 45lb a cubic foot.

TIMBER 435

D. parviflora, *Griff*, *Fl Br Ind*, *I*, *38*. 436

Vern —*Lingyau* BURM

Habitat —A tall, deciduous tree, met with in the forests of Tenasserim, Mergui Pegu, and the Andaman Islands

Properties and Uses —Same as those recorded under the other species.

USES 437

438

Dillenia pentagyna, *Roxb.; Fl. Br. Ind., I., 38.*

Syn.—D. AUGUSTA and PILOSA, *Roxb.;* COLBERTIA COROMANDELINA, *DC.;* C. AUGUSTA, *Wall.*

Vern.—*Agar,* MONGHYR; *Karkotta,* BENG.; *Korkotta, rai,* KOL. and MAL. (S. P.); *Korkot,* ORAON and SANTAL; *Akshi, daine-oksi, okoi,* ASSAM; *Rai,* URIYA; *Tatri,* NEPAL; *Shukni,* LEPCHA; *Akshi,* MICHI; *Akachi, uchkai,* GARO; *Kallei,* GOND; *Mirchi,* BAIGAS; *Aggai,* OUDH; *Suarul,* MELGHAT; *Pashkouli,* RAJBANSHI; *Kallai, suha-rúk,* (Bori), C. P.; *Karamala, kanagalu,* BOMB.; *Kanagalu, karamal,* or *karmal,* MAR.; *Kanagala,* KANARA; *Malé geru,* COORG; *Rai, pinnai, nai-ték,* TAM.; *Ranadan, chinnakalinga,* TEL.; *Machil, kaltera, kadkanagola, kanagole,* KAN.; *Zambrún,* MAGH.; *Zimbyun, zenbyoon,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 451; Brandis, For. Fl., 2; Kurz, For. Fl. Burm., I., 21, 22; Gamble, Man. Timb., 3; Dalz. & Gibs., Bomb. Fl., 2; Elliot, Fl. Andh., pp. 42, 163; Mason, Burma and Its People, 532, 741; Lisboa, U. Pl. Bomb., 1, 143; Burm. Gaz., 2, 126; Mys. Gaz., I., 48; III., 16; Forest Admn. Report, Chutia Nagpur, 1885, 28; Bombay Gazetteers, XIII., Pt. I. (Thana), 25; XV., Pt. I., 67; XVII., 25; Indian Forester, Vol. I., 78, 79, 84, 67, 88; II., 18; III., 200; IV., 292; VI., 125; VIII., 412; X., 325, 326; XI., 252, 485; XII., 311; XIII., 119; XIV., 199, 297.*

Habitat.—A deciduous tree of Oudh, Bengal, Behar, Assam, Central, South, and Western India, and Burma. In young trees the leaves are sometimes as much as two feet in length. The tree flowers in March and April, and is frequently associated with *sál* in the forest-clad lower hills of the Central table-land.

FIBRE. 439

Fibre.—Cordage is said to be made of the bark. (*Lisboa, U. Pl., Bomb.,* 2.)

FOOD. 440

Food.—The flowers, buds, and fruit when green are eaten by the natives. The berry is said to have an agreeable acid flavour, resembling that of **Grewia asiatica.** The fruit is also greedily eaten by animals. (*Kanara Gazetteer.*) In Thana the deer are said to be specially fond of these fruits.

TIMBER. 441

Structure of the Wood.—Rough, moderately hard, reddish-grey; apt to split, warp, and crack; strong, heavy, durable, handsomely marked on a vertical section by the darker-coloured medullary rays which appear as broad plates. Weight 41 to 50lb a cubic foot; growth moderately fast.

It is used for construction, ship-building, rice-mills, and for charcoal, which is of good quality. In Kanara it is considered useless except for burning; in Thana the wood is also regarded as worthless. Lisboa, however, in his special botanical volume to accompany the *Bombay Gazetteers,* says: "the wood is very strong, hard, heavy, porous, coarse-grained, durable, &c." He adds that it is "used for house and ship-building, buggy-shafts, rice-mills, and charcoal."

DOMESTIC. Thatching. 442

Domestic Uses.—The leaves are sold in the bazar at Poona as a substratum for thatching. (*Dalzell and Gibson.*) It is stripped of its leaves and pollarded, in Kanara, to afford leaf-manure. The old rough leaves are employed to polish ivory and horn.

443

D. pulcherrima, *Kurz.; Fl. Br. Ind., I., 37.*

Vern.—*Byú,* BURM.

Habitat.—A large tree in the tropical forests of Pegu, Prome, and Martaban, ascending to 1,000 feet in altitude

TIMBER. 444

Structure of the Wood.—Hard and strong, used for rice-mills, but the trunk usually remains low and crooked (*Conf.* with *Indian Forester, VIII.,* 416).

Dindiga Gum; see **Anogeissus latifolia,** *Wall.;* Vol. I., No. 1149, p. 256.

DINEBRA, *Jacq ; Gen Pl, III, 1171.*

Dinebra arabica, *Beauv, Duthie, Fodder Gr, N Ind, 55 ;* GRAMINEÆ. 445

sparsely to be regarded as a valuable wild fodder

FODDER 446

DINOCHLOA, *Gen Pl, Vol III, 1214.*

Dinochloa andamanica, *Kurz,* GRAMINEÆ 447

References —*Kurz, For Fl Burm, II, 570, Indian Forester, I, 242, Gamble, Man Timb, 431*

Habitat —A lofty scandent bamboo, met with in the tropical forests of the Andaman Islands

D. Maclellandii, *Kurz.* 448

Syn —BAMBUSA MACLELLANDII, *Munro*

Vern —*Wa nway,* BURM

References —*Kurz, For Fl, Burm, II, 571, Indian Forester, I, 242, 264 Gamble, Man Timb, 431*

Habitat —A native of Burma and Chittagong, stems scandent, 60 to 100 feet.

DIOSCOREA, *Linn, Gen Pl, III, 742* 449

HISTORY OF YAMS. 450

History of Yams —Modern usage has assigned to the tuberous roots of the various cultivated species of Dioscorea the name of Yam It is generally stated that Yam is derived from a West Indian or an American word passing through the Spanish and Portuguese ... and th

Inhames 451

"Moreover, it produces great abundance of *inhames,* or large subterranean tubers of which there are many kinds, like the *camottes* of America, and these *inhames* boiled or roasted serve in place of bread" The

DIOSCOREA. Dioscoreas—Yams.

HISTORY.

what he calls "*Iniamos*" and "*Batatas.*" He speaks of them as "fruits"—a mistake made by most early writers, and which, indeed, has not been completely eradicated from popular fancy even at the present day, for the words vegetable and fruit are often used as synonyms. Speaking of yams, however, Linschoten says: "These Iniamos are as bigge as a yellow roote" (is carrot meant?), "but somewhat thicker and fuller of knots and as thicke on the one place as in the other, they grow under the earth like earth Nuts, and of a Dun colour, and white within like earth Nuts but not so sweete. The Batatas are somewhat more red of colour and of fashion almost like the Iniamos but sweeter, of taste like an earth Nut. These two fruits are verie plentiful, specially Iniamos, which is as common and necessarie a meat as the Figges" (he alludes here and throughout his work to 'Plantains,' which by mistake was translated 'Figges'), "they eate them for the most part rosted, and use them commonly for the last service on the boorde, they sieth them likewise in another sort of porrage, and sieth them with flesh like Colwartes or Turnops, the like doe they with Batatas." Now to remove all doubt as to the Indian so-called Iniamos, which were, 300 years ago, so "verie plentifull" and "necessarie" as plantains to the people of the west coast of India, a further quotation may be given from Linschoten, where he returns again to the subject of Iniamos. Speaking of the *Azores* he writes: "They have likewise in that island a certaine fruite that groweth under the earth, like Radishes or other roots, but the plants are trees like vines but different in leaves, and groweth longwise upon the grounde; it beareth a fruit called Batatas, that is very good, and is so great that it weigheth a pound, some more, some lesse, but little esteemed, and yet it is a great sustenance and foode for the common sort of people. It is of good account in Portingall, for thether they used to bring it for a present, and those of the Ilande by reason of the great abundance doe little esteeme it." Now, whatever may have been the *Batatas* as distinct from the *Iniamos*, one point is certain—neither can for a moment be supposed to have been Aroids. They were "vines" with leaves of a peculiar form (a remark that suggests the striking foliage of most Dioscoreas), and they were "vines" so large that he pronounced them "trees like vines." The use of the word "trees" almost precludes the idea of an Ipomœa (or Convolvulus), and the habit of creeping on the ground gives weight to the supposition that by Batatas he meant simply another form of Iniamos, the more so since the natives of India and of many other countries regularly allow one or two species of yam (or Dioscorea) to grow along the ground instead of affording them the means of twining. The sub-woody stems of most Dioscoreas might fairly well be viewed as admitting the expression 'trees,' whereas that word would be wholely inapplicable to the sweet-potato. One can hardly presume Linschoten to have failed to specialise the foliage if it had (as in the case of the sweet-potato) a resemblance to a plant with which he was probably quite familiar—the Convolvulus. It is much more natural that he used the word Batatas because that word had just then reached Europe. He evidently preferred to adopt words known in Europe to giving the native names; had he mentioned the Indian vernacular names also instead of using foreign words only—*Iniamos* and *Battas*—much of the confusion that now exists would have been saved. Dr. Paludanus, in a foot-note to Linschoten's account of yams (or yams and sweet-potatoes), says: "Iniamas were this year brought hether out of Guinea as big as a man's legge and all of a like thickness, the outward part is dun-coloured, within verie white, rosted or sodden they are verie pleasant of taste, and one of the principal meates of the Black [?Moores]." In 1597, the very time Paludanus wrote this note, Gerarde was experimentally cultivating the sweet-potato in his garden

Iniamos
Conf. with p. 123.
452

HISTORY.

'but sweeter of
vith some of the
If this view be

Rukt alu.
454

Kanda.
455

ns on the western coast
ATO, and there seems no
hould have been assign-
which is now known as

Potato.
456

'THE POTATO.' The latter tuber was taken to Europe *after* the sweet-potato, and in the words of Yule and Burnell (*Glossary of Anglo-Indian Terms*) may be said to have robbed it of its name. This is more than an interesting historic fact. The frequent allusion to the *inhames* being used "in place of bread" suggests the possibility of the sweet cassava (Manihot Aipi) being
if so the European form of tl
the wrong plant. Thus sweet
cepted as confused with one a

DIOSCOREA. **Alu said to be an Aroid.**

HISTORY.

and, indeed, the literature of even the potato has to some extent got mixed up with that of the above allied tubers. A similar confusion exists in India. The potato and sweet-potato are undoubtedly modern introductions, but there are many wild species of **Dioscorea** scattered over the whole of *Peninsular India*, some peculiar to the hot, damp, tropical plains, others to the drier tracts, while a third set ascend to temperate regions and are met with throughout the Himálaya at altitudes up to 9,000 feet above the sea. That being so, the presumption may be admissible that most of the forms of yam met with under cultivation in India are probably indigenous also, even though in some cases they are not now known in a wild state. The name *álú* by universal modern acceptance is given, however, to the potato, and that word is by no means recent in Indian classical literature. It can be traced into some of the early Sanskrit works. It is there applied to a farinaceous tuber—perhaps to several such tubers—being, in its earliest meaning, generic more than specific. Sir Walter Elliot (*Flora Andhrica*) gives the Telegu words *Allu* to the millet—**Paspalum scrobiculatum**; *kand-alu* to the pulse—**Cajanus indicus**; *alachand alu* to the pulse—**Vigna Catiang**; and *Machi-kanda* and *Páti-kanda* to **Amorphophallus**. We have no alternative, therefore, but to assume that the potato on being brought to India received an ancient name, and further, that the superior properties of the introduced tuber gradually displaced the indigenous one from public favour. According to Professor Wilson, and more recently to Yule and Burnell, the *álú* of early Indian classics was an aroid and most probably **Amorphophallus campanulatus** (see *Dict. Vol. I.*, A. 996). But **Amorpho-phallus** is a distinctly tropical genus of **Aroideæ** and does not extend beyond the Himálaya. If therefore *álú* was originally given to an aroid it may have denoted a species of **Arisæma** (to some extent an extra-tropical genus), but in India the members of that genus are all poisonous and none of them are cultivated.* Mr. John Crawford, in a most valuable paper on the *Migration of Cultivated Plants in reference to Ethnology* (*Selections in the Agri.-Hort. Soc. of India Jour., Vol. I., New Series, 1868, p. 15*), says, that the word *álú* had a generic meaning with the Hindús of Upper India, being equivalent to *kalangku* with the Tamil-speaking people and *ubi* with the Malayan nations. He is also disposed to view *álú* as having been originally applied to an aroid and "not to the yam with which as an extra-tropical people the Sanskrit-speaking race must have been unacquainted." While not prepared to dispute an opinion held by so many high authorities, the writer may be permitted to say that he would be more disposed to accept a **Dioscorea** as having been the plant to which the word *álú* was applied when it first received (and probably in India) a restricted or specific meaning. But even the idea of "an extra-tropical people" can have little weight, since various species of **Dioscorea** are temperate Himálayan plants and are distributed even to Afghánistan. Aitchison, for example, found **D. deltoidea** in low scrub from 7,000 to 8,000 feet in altitude, near Shálizan in Afghánistan.* Unless *álú* be taken as a form of *olla* (a Sanskrit name for **Amorphophallus**, from which the modern Bengali term *ol* is derived), there are probably no other references in Sanskrit literature to *álú* that could with any degree of certainty be accepted as alluding to an aroid. But the question may fairly well be asked, as against the argument resting on the Sanskrit-speaking people having been "extra-tropical"—how did the tropical **Amorphophallus campanulatus** come to get its early Sanskrit names? There are several well-known Sanskrit synonyms for that aroid, such as *surana*, *kanda*, and *arsaghna*. In none of the modern languages of India does **Amorphophallus** bear a name traceable to *álú*, while the Sans-

Conf. with p. 120.

Conf. with p. 122.

Olla. 457

Surana. 458

* *Conf. with* Dr. D. Prain's *remarks on page* 122.

HISTORY.

Kachalu. 459

ultimately the name Colocasia itself Mr Baden Powell mentions a curious fact, namely that in the bazars of the Panjáb the tubers of Dioscorea deltoidea are viewed as the *kachalu* collected from old plants On the other hand, in nearly every dialect of India, *alu* is, at the present day, the generic name for the Dioscoreas, the species being indicated by qualifying or descriptive prefixes It is noteworthy also that the Tamil name
onyms of *alu*—should now be
writer as Ainslie should give
English Yam) He tells us
had just then been introduced
n error (in assuming the cor-

lattice work and to
as, therefore, a climber, and the description of the leaf precludes it from having been the sweet-potato In another page both the *Kachalú* and the *Suran* are described, so that the *Pindalu* could not have been an aroid Throughout

Hindu general name is *alu* preceded by a special name for each species or variety; *kamálu*, for instance, is Dioscorea alata The absence of distinct names in each province also argues a recent cultivation." A reference to the vernacular names given under each species (in the pages which follow) will show that even this last conclusion is not well founded In most of the languages of India there are several names for the species (wild and cultivated) of Dioscorea—every shade of cultivated form frequently having its distinctive name.

Conf with p 121.

* Conf. with Dr. Dymock's remarks on page 121.

DIOSCOREA. **Kriss—the Yam.**

HISTORY.

It may be admissible that most of the cultivated plants which the invading Sanskrit-speaking people found in Hindústan, and which were unknown to them before their arrival in India, received from them Sanskrit names (or Sanskritised forms of their aboriginal names), or had old generic Sanskrit names in time restricted or specifically applied to them. It would, indeed, be unsafe to assume that the pre-Aryan people of India did not possess some wild or cultivated plants of value which were unknown to their conquerors. The Santals and other aboriginal races have names for most of the **Dioscoreas** which have no connection with the Sanskrit names for these plants. Thus the **Rev. A. Campbell** tells us that **D. bulbifera** is known to the Santals as *Piska*, and that its tubers are considered a "great delicacy." In Bombay that plant is known as *mar-páshpoli*. **D. glabra**, **Mr. Campbell** also says, affords edible tubers, which are known as *Ato sang*, and **D. globosa** the *Bengo nari*. In many parts of Western India **D. pentaphylla** is known by the name *úlsi* or *úlasi* (*ufi*, *ubi*, *papa*, are American names). The name *kríss* seems to be the most general for the species of **Dioscorea** in the Panjáb, but that name is practically confined to the hill tribes; the tubers when offered for sale are known as *tarar*, a name that at once brings to mind the Malay *tallus*, *tales*, the Otahitan *tallo* or *tarro*, and the Bombay *terem*, names for **Colocasia antiquorum** (*Conf.* with *Dict. Vol. II.*, **C. 1731**). The *Ain-i-Akbari* (1590 A.D.) describes what appears to be a Yam under the name of *Tarrí*. It is said to grow mostly in the mountains and to produce tuberous roots so large as to suggest the resemblance to a "mill-stone." It is spoken of as a creeper with leaves resembling those of the water-melon (*Blochmann's Transl.*, *p. 71*). **Atkinson** affirms that in Kumáon **D. sagittata**, *Royle*, is known as *tair* and *turar*, words which (with the Panjáb *tarar*) may be admitted as recalling one of the generic names,—*tega*—which **Sir Walter Elliot** states is, with the Telegu-speaking people, a synonym for the Sanskrit *pindáluh* (see also *Wilson, Sanskrit Dict.*, *p. 384*, and *Heyne, Tracts on India*, *p. 55*). The commonest Telegu generic name for all the **Dioscoreas**, **Elliot** informs us, is *pendu lam*, which he points out is the equivalent to the Sanskrit *pindáluh*. Under *Chára kanda* (**Colocasia nymphæifolia**), **Sir Walter** draws attention to the fact that **Brown**, in his *Dictionary*, is incorrect in assigning **Wilson's** account of the *pindálu* to a **Colocasia**; **Elliot** makes no mention of *álú* or any form of that word as applied to any aroid. Thus, it may safely be affirmed that throughout India there are names for the **Dioscoreas** that belong to the languages of the aboriginal races as well as those that are of a more classical character, the latter most frequently approaching to the word *álú*, while a third set of names may have been derived from foreign and mostly American sources.

Piska. Conf. with p. 136, the Kullu. 460

Turar. 461

Conf. with p. 118.

It seems probable that, as articles of food, the **Dioscoreas** of the world were cultivated at a much later date than most other vegetables, probably on account of the fact that without the trouble of cultivation they afforded an unfailing supply of food. The ancient Egyptians were not aware of the value of these tubers, and, indeed, they are doubtfully cultivated (or only to a small extent) in the Egypt of to-day. The volume of existing evidence on the origin of the cultivated **Dioscoreas**, however, points to a possible independent discovery in Asia, America, and Africa. Interchanges from these regions might easily have taken place down to the present time, and the knowledge of the properties of these useful cultivated tubers may be assumed to have thus become widely and rapidly diffused. From the Indian source cultivated forms may have been carried to the West Indies, or others brought from the West Indies to India during the period of Dutch and Portuguese influence. **DeCandolle** states that

in Mauritius a yam bears the name of *Cambare marron* "Now, he adds' *Cambare* is something like the Hindu name *kam*, and *marron* indicates a plant escaped from cultivation" But this derivation ignores the fact that *Camotes* is a Mexican name for the sweet potato, so that the syllable "Cam" in American words and *Khám* in Indian, need be viewed as nothing more than a coincidence On the other hand, many writers

Camotes. 462

Kam Conf with pp 125 and 135 463

number and abundance on passing into the Eastern Peninsula They are, however, nearly as abundant on the Western coast, but become rare

&c., &c, are all designated yams This fact has compelled the writer, in drawing up the present account of the species of Dioscorea, to reject all descriptions of yams in which he could not, from internal evidence, discriminate the plant or plants referred to This has naturally deprived him of more than half the economic information that exists on the subject of yams, and has reduced very considerably the list of vernacular names that doubtless might be given for the species of Dioscorea It may here

p. 125.

key to any re-arrangement that may be found necessary on the Indian species of Dioscorea being re-determined and described Even in cases

is exhibited its vernacular names, structural and economic peculiarities,

Dymock of Bombay, and the other from Dr D Prain, Curator of the

, thus obtained, in

give these com-

Alu. 464

was,

it is

tree-a

but s

purely

Kachu. 465

name for these plants, is also Sanskrit *Kachora* and *kachu* are applied to the Curcumas in Hindi, Marathi, and Bengali Amorphophallus is

Surana. Conf. with p. 118. 466

Súrana, and *ola* or *ollá* in Sanskrit and in the vernaculars; it is also *Kand* in the vernaculars as *Jini-kand* (Edible tuber). *Súrana* is derived from *súr* to hurt; all the wild kinds are very irritating. In Marathi the name *Súran* seems to be applied to all Aroids having the peculiar shaped tuber of Amorphophallus.

"As regards yams we find purely Sanskrit names in the vernaculars, such as *Púsh-poli*, from *púsh* a noose, and *poli* a cake, Anglic—strangle-cake, since the wild kinds irritate the throat and cause a sensation of strangling. This name is current in Marathi for wild yams, which are also called *Manda*, a Marathi name for a cake like a mincecake, full of *Rawa* and sugar instead of mince-meat.

"Cultivated yams are called *kon* and *konphal* in Marathi, *kand* in Hindi and Guzerathi, from the Sanskrit *Kanda*. This word spelt *Kandá* is applied to all tuberous roots and bulbs in Marathi just as it is in Sanskrit. Another Marathi name for cultivated and uncultivated yams is *Cháin* or *Cháyen*. The Sanskrit names *alu* and *kanda* are about as vague as the *Bolbos* of the Greeks, but we know that *surana* means Amorphophallus from the epithet *Arso-ghna* or 'destroyer of piles' applied to it, for it is still used as a remedy for piles."

Dr. D. Prain's note has special reference to the distribution of the species of Dioscorea and of Arisæma:—

"I have gone through the whole of the works dealing with the 'Orient' of Boissier and the 'Central Asia' of the Russian writers, and I find that none of them mention either Colocasia or Amorphophallus. Boissier's Supplement brings our knowledge down to 1888, and Trautvetter's Incrementa to 1884, while Maximowicz's last paper (*Mel. Biol.*, *XII.*) brings us also down to March 1888.

"Arisæma finds no place in the pages of Russian authors. In the *Flora Orientalis*, *V.*, *43*, Boissier describes A. abbreviatum, but he states that he had not seen the plant, and he gives only Aitchison's Kuram Valley Flora locality. In the App. to V. (p. 734) he adds A. Jacquemontii, also from Aitchison's Kurram plants, remarking that he has seen the plant himself. He does not, however, give any other locality for either species, nor does he mention any economic uses.

"No Dioscorea appears in *Ledebour*, the standard Russo-Siberian Flora. Maximowicz gives Dioscorea 5-loba in *Prim. Flor. Amur. et Mands.* He mentions no other in any of his 'diagnoses' (of which he publishes the 12th paper this year), nor does Trautvetter *l. c.*, who brings the Russian Flora up to date at intervals.

"Boissier notes (under Tamus), on Baker's authority, that Aitchison had found D. deltoidea in Kurram, but for all that he does not provide a description of it in his Flora. I find no mention under the families you refer to of any edible tuber, either in Boissier or in the Russian authors."

CULTIVATION OF YAMS IN INDIA.

CULTIVATION. 467

The yam may be propagated by means either of the ærial tubers which form on the stem or by means of small under-ground tubers or portions of large ones. The ærial tubers are not, however, often used, as the plants in that case require two years to reach maturity. The usual process is to dig the ground to a considerable depth and to manure it fairly well; then form pits near trees, so as to afford support for the climbing stems, and deposit in each pit a small tuber or portion of a large one. Lateral shoots should be nipped off, otherwise large tubers will not form. If it be desired to plant an area of ground entirely with yams, the ground should be trenched and the tubers deposited two feet apart along the furrows. To afford support for the plant a trellis work should be constructed between the ridges. The Chinese

Method of planting. 468

CULTIVATION.

have a method of producing a large crop of small tubers without having to incur the expense of providing a support for the plants The tubers are planted 3 or 4 feet apart along the crest of ridges, and the stems made to take root at various points by being pinned down on the ridges By this means a crop of tubers very much like potatos is produced, the tubers forming at each point where the stem is pinned down into the earth It is often the case in India that the long stems are not provided with a support nor are they pinned down. They are simply allowed to spread over the ground This is a slovenly practice and results in much smaller tubers than when the stems are provided with a means of climbing. Firminger states

Conf. with p. 116.

Seasons of Planting and Reaping. 469

scattered notices.

472 Stack

473 Lisbon Yam,

474

planted again

"I am unable to say why they have not yielded a better return; possibly they may not have been long enough acclimatised, or were planted too late last year. They appear, however, to be thriving now, judging by the

CULTIVATION

and delicious food. In fact, the Buck-yam is superior, in the opinion of many, to the best potatos.

"I am also conducting experiments in the Hill near Hope Town at different elevations with these yams, with the kind co-operation of Messrs. Johnstone and Calvert, who have planted several at lower elevations. The first I planted in March, at 5,200 feet above sea level, rotted almost without exception before the roots and germinal shoots from the bark had time to appear. I, therefore, waited until May and planted out fifty more which had already sprouted, and most of them grew up and looked healthy.

Introduced Forms not suited to the hills. 475

"The result of this hill experiment will also be communicated to you. I fear, however, that at elevations above 3,000 feet, the yam can scarcely prove a valuable addition to the root crops of the hills, being too much of an exotic. In the plains, however, where the rainfall is not less than fifty inches and fairly distributed, and the soil arenaceous and moderately good, the West Indian yam should prove a valuable addition to the food of the people. It requires from seven to eight months to attain to its full growth, and should be provided with sticks to run on, although a small patch, which was not supplied with poles, produced about as much as the rest of the ground where a bamboo trellis was provided to support the vines.

Water Yam. 476

"My father and I have experimented on yams for many years. I obtained from Barbadoes some of the finest varieties of the water yam, which in that island seldom exceed eight or ten pounds in weight. In Trinidad, however, the plants throve amazingly, and the weight was increased. In one instance a yam which I had dug and weighed myself turned the scale at 82lb, and many others averaged from 30 to 50lb; moreover, these enormous yams did not in any way deteriorate in flavour, and proved quite as delicate as the original stock.

82 lb. in weight.

"Should you arrive in Calcutta before the vines wither, about X'mas time, I should have much pleasure in showing you the patch of yams at present under experiment.

Manure. 477

"The cultivation is simple, but laborious. The ground is dug into trenches about two feet wide by eighteen inches deep, three feet apart from centre to centre. The trenches are filled with leaves, weeds, and garden rubbish of all kinds, which admit of the free expansion of the tubers. The mould from one trench forms the bed over the preceding one. The soil being uniformly good it does not matter much where the sub-soil is placed; if poor I should put it beneath in direct contact with the accumulated vegetable matter and out of the way of the young rootlets, seeking the nourishment which they would be more likely to find among the humus of the surface soil.

Tubers. 478

The yams, cut to about the size of an ordinary man's fist, care being taken to preserve as much of the outer surface as possible, are planted at intervals of three feet in the beds. The lops in the absence of seeds are the legitimate plants, and rarely fail to grow.

Seed. 479

Seeds where procurable made excellent plants. There are seasons, however, when few, if any, appear—why I am unable to say—although this has also been a subject of experiment. As far as I have observed, however, the coarser varieties bear seeds most abundantly and frequently.

Mode of sprouting. 480

"I prefer sprouting the pieces of yam cut for plants under a layer of grass and mould a few inches thick, which should be watered at intervals. The seed bed should be prepared in the end of March, or early in April, when the seasons are similar to the weather in Calcutta. In from 3 to 6 weeks the yams commence to sprout and should be planted out at once, as the young shoot, which grows with great vigour and rapidity, even in the corner of a dark room on a stone floor, soon weakens the parent."

The writer would wish it to be understood that since a monograph of the Indian species of Dioscorea has not as yet been published, the following notes must be viewed as an attempt to relegate existing information to the species probably concerned When the species have been examined, however, considerable departures from the present arrangement may doubtless be found necessary, the names and synonyms having to be changed.

Conf. with p. 121.

481

Dioscorea aculeata, *Linn.; Roxb., Fl. Ind., Ed. C.B C., 728; Wight, Ic., 2060;* DIOSCOREACEÆ.

PRICKLY-STEMMED YAM or GOA POTATO; KAAWI YAM; the GUINEA YAM.

TUBERS.

482

CULTIVATION.

and delicious food. In fact, the Buck-yam is superior, in the opinion of many, to the best potatos.

"I am also conducting experiments in the Hill near Hope Town at different elevations with these yams, with the kind co-operation of Messrs. Johnstone and Calvert, who have planted several at lower elevations. The first I planted in March, at 5,200 feet above sea level, rotted almost without exception before the roots and germinal shoots from the bark had time to appear. I, therefore, waited until May and planted out fifty more which had already sprouted, and most of them grew up and looked healthy.

Introduced Forms not suited to the hills. 475

"The result of this hill experiment will also be communicated to you. I fear, however, that at elevations above 3,000 feet, the yam can scarcely prove a valuable addition to the root crops of the hills, being too much of an exotic. In the plains, however, where the rainfall is not less than fifty inches and fairly distributed, and the soil arenaceous and moderately good, the West Indian yam should prove a valuable addition to the food of the people. It requires from seven to eight months to attain to its full growth, and should be provided with sticks to run on, although a small patch, which was not supplied with poles, produced about as much as the rest of the ground where a bamboo trellis was provided to support the vines.

Water Yam. 476

"My father and I have experimented on yams for many years. I obtained from Barbadoes some of the finest varieties of the water yam, which in that island seldom exceed eight or ten pounds in weight. In Trinidad, however, the plants throve amazingly, and the weight was increased. In one instance a yam which I had dug and weighed myself turned the scale at 82lb, and many others averaged from 30 to 50lb; moreover, these enormous yams did not in any way deteriorate in flavour, and proved quite as delicate as the original stock.

82 lb. in weight.

"Should you arrive in Calcutta before the vines wither, about X'mas time, I should have much pleasure in showing you the patch of yams at present under experiment.

Manure. 477

"The cultivation is simple, but laborious. The ground is dug into trenches about two feet wide by eighteen inches deep, three feet apart from centre to centre. The trenches are filled with leaves, weeds, and garden rubbish of all kinds, which admit of the free expansion of the tubers. The mould from one trench forms the bed over the preceding one. The soil being uniformly good it does not matter much where the sub-soil is placed; if poor I should put it beneath in direct contact with the accumulated vegetable matter and out of the way of the young rootlets, seeking the nourishment which they would be more likely to find among the humus of the surface soil.

Tubers. 478

The yams, cut to about the size of an ordinary man's fist, care being taken to preserve as much of the outer surface as possible, are planted at intervals of three feet in the beds. The lops in the absence of seeds are the legitimate plants, and rarely fail to grow.

Seed. 479

Seeds where procurable made excellent plants. There are seasons, however, when few, if any, appear—why I am unable to say—although this has also been a subject of experiment. As far as I have observed, however, the coarser varieties bear seeds most abundantly and frequently.

Mode of sprouting. 480

"I prefer sprouting the pieces of yam cut for plants under a layer of grass and mould a few inches thick, which should be watered at intervals. The seed bed should be prepared in the end of March, or early in April, when the seasons are similar to the weather in Calcutta. In from 3 to 6 weeks the yams commence to sprout and should be planted out at once, as the young shoot, which grows with great vigour and rapidity, even in the corner of a dark room on a stone floor, soon weakens the parent."

The writer would wish it to be understood that since a monograph of the Indian species of Dioscorea has not as yet been published, the following notes must be viewed as an attempt to relegate existing information to the species probably concerned. When the species have been examined, however, considerable departures from the present arrangement may doubtless be found necessary, the names and synonyms having to be changed.

Conf. with p. 121.

481

Dioscorea aculeata, *Linn.; Roxb., Fl. Ind, Ed. C.B.C., 728; Wight, Ic., 2060;* DIOSCOREACEÆ.

PRICKLY-STEMMED YAM or GOA POTATO; KAAWI YAM; the GUINEA YAM.

TUBERS. 482

this plant under cultivation. To Roxburgh it was only known as a wild product. The Father of Indian Botany says that the tubers in his time

ment should have been that none of the Bengal cultivated species had

493 **Dioscorea Batatas,** *Decaisne.*

Vern.—*Sain-in*, CHINESE.

References.—*DeCandolle, Origin Cult. Pl., 78; Agri.-Hort. Soc. Ind., IV., New Series (1874), p. 40.*

Suitable for hill cultivation.

Habitat.—Extensively cultivated in China, but not hitherto found wild in that country. Was early introduced into Europe, where it may occasionally be found under cultivation, though it has not attained a high reputation as a vegetable; but it is the most temperate of the cultivated species hitherto brought to notice, and is thus the one which might succeed best in the higher alpine regions of India.

According to some writers this is only a cultivated state of **D. glabra,** *Roxb.*, and on this account mainly is it mentioned in this work, since apparently the cultivated plant as described by **Decaisne** is not grown in India.

494 **D. bulbifera,** *Linn.; Wight, Ic., t. 878.*

BULB-BEARING YAM.

Syn.—HELMIA BULBIFERA, *Kunth.*; DIOSCOREA TAMNIFOLIA, *Salisb.*; D. PULCHELLA, *Hokenhacker*; D. PULCHELLA, *Roxb.*

Vern.—*Zamin kand*, HIND.; *Piska*, SANTALI; *Zamín khand* (the tubers), PB.; *Karinda* (or *hadu-karanda*), BOMB.; *Karanda*, POONA; *Karu-karinda*, DEC.; *Kurú kanda*, CHANDA; *Kathálu, patni-alu, mati álu*, ASSAM; *Maláká-káya-pendalam* (a form introduced from the Straits), *chedu paddu dumpa* (according to **Elliot**, for **D. pulchella,** *Roxb.*), TEL.; *Katu-katsjil*, MALAY; *Panúkondol*, SING.

References.—*Thwaites, En. Ceylon Pl., 326; Dalz. & Gibs., Bomb. Fl., 247; Stewart, Pb. Pl., 229; Drury, Hand-book, Indian Flora, III., 277; Rheede, Hort. Mal., VII., t. 36; Kunth, Enum., V., 435; Trimen, Cat. Ceylon Pl., 93; Year-Book, Pharm., 1878, 275; Bomb. Gaz. (Poona Dist.), XVIII., 56; Baden Powell, Pb. Pr., 259; Drury, U. Pl., 182; Lisboa, U. Pl. Bomb., 179; Birdwood, Bomb. Pr., 178; Sir W. Elliot, Fl. Andh., 110.*

Habitat.—Wild in Sylhet, Chittagong, and throughout the Western Gháts to Bombay. Cultivated in the Western Presidency, especially in the Konkan. It is also mentioned by **Aitchison** as occurring at Moradabad and Simla, and is enumerated by **Strachey** and **Winterbottom** as met with at Almora, flowering in July. **Baden Powell** refers to samples of this tuber having been sent to the Lahore Exhibition from Simla, Kashmír, and Hushyarpur. (*Conf.* with the tuber described under **D. deltoidea,** which is specially mentioned by **Aitchison** as collected at Hushyarpur.) **Baden Powell** accepts the tubers sold under the name of *Zamín khand* as being those of this species. Of the *karanda* yam of Poona it is said that it differs from the *kon* (**D. alata**) in having rounder leaves and in bearing bulbs on the stems as well as on the roots. **Elliot** says that **D. bulbifera** was introduced into India from the Straits.

See p. 130.

MEDICINE. Tubers. 495 Leaves. 496

Medicine.—The TUBERS are applied to ulcers after being dried and powdered. In the plains of the Panjáb the LEAVES of a species of **Dioscorea** (most probably this) are used medicinally and sold under the name of *tarar puttr.* **Baillon** (*Dictionnaire de Botanique, Vol. II., p. 437*) alludes to the known febrifugal property of the leaves of certain species of **Dioscorea,** rendering them useful in the treatment of intermittent fevers.

FOOD. Tubers. 497

Food.—The bulbules on the stems and the tubers under ground are used as vegetables (*Birdwood*). The latter are bitter, but are rendered eatable by being covered with ashes and steeped in cold water. In a report on Assam it is stated that the tubers are boiled in *khar* water, or in an acid before being eaten. The **Rev. A. Campbell** says that cattle eat the leaves.

Dr. Stewart, under the name of **D. deltoides,** *Wall*, "(and **D. bulbifera,** *L.*?)" gives the following vernacular names: *kníss, kríss, tar, kithí, tardí,*

gúngrú, kaspat, &c, and states that the plant he refers to grows abundantly in many parts of the Panjab Himálaya, that the root (several pounds in weight) is largely eaten, cooked, by various classes in parts of the Siwaliks and outer hills, *after steeping it in ashes and water to remove acridity* It is difficult to know to which of the Panjáb species Stewart more particularly refers He says that in Kashmir the roots are employed for washing pashm and wool cloth Vigne (Stewart further informs us) affirms that a smaller kind is used to wash cotton cloth, and a third reputed to be used

FOOD.

it is fit to be eaten It is used also as pickle. For this purpose it is cut into little pieces and fried in oil till it becomes of a red colour, and then it is put into vinegar, &c, or in the mixture of mustard seeds ground up with salt, &c, in water or oil which is sometimes used as a preservator "

Domestic Uses —"The tubers of this species are employed by the *Singhalese for attracting fish to certain spots where they can be easily* caught The tubers are broken into pieces and thrown into the water daily for some time" (*Thwaites*)

DOMESTIC. 498

Dioscorea crispata, *Roxb ; Fl Ind, Ed C B C, 728*

499

Habitat.—" A native of the interior of Bengal " (*Roxb*), and according to Kurz, of Pegu in Burma, flowering time, the rainy season

D. dæmona, *Roxb , Fl Ind, Ed C B C, 729, Wight, Ic, t 811*

500

Syn —HELMIA DÆMONA, *Kunth, Enum , V, 439*, UBIUM SILVESTRE, *Rumph, V, t 126*

Vern.—*Pedumpa, puli dumpa,* TEL , *Kyway, kyway nway, kyway pin,* BURM

References —*Kurz, Pegu Report Voigt Hort Sub Cal, 653 Dalz & Gibs, Bomb Fl, 247 Atkinson's Him Dist, 602, Hooker, Niger Flora, 538, Elliot, Fl Andh, 147, 158*

Habitat —Roxburgh mentions this as a native of the Gorakhpore

Nauseous Tubers 501

East Indian plant"

Food.—The tuber is very nauseous, even after being carefully boiled.

FOOD. Tubers. 502

D. deltoidea, *Wall*

503

Vern —*Gun,* KUMAON, *Kniss kriss, tar, kithi, kheli, dharur, tardi, tharri, kíns, gungrú kaspat, parwatti,* and the bazar name for the medicinal leaves *tarar pattr,* PB Baden Powell gives this species the Panjábi names *tarar, krish*

References —*Stewart, Pb Pl, 229, Baden Powell, Pb Prod, 259, 378*

Habitat.—A common Himálayan species, occurring between 3 000 and 8,000 feet flowering time, May It often attains a considerable size, spreading over trees and bushes for 15 to 20 feet Frequent in the vicinity

of Simla and throughout Kulu, being distributed into Afghánistan. The deltoidly often trilobed leaves of this plant are very characteristic, but the small flowers occur on a lax, elongated axis in a manner peculiar to this plant.

The above Panjáb vernacular names are taken from Stewart's *Panjáb Plants*, but it seems probable they are the names not for one species of **Dioscorea** but for all those met with in the Panjáb Himálaya. These names are, from a historic point of view, of great interest, and are reproduced here (and also under **D. bulbifera**) in the hope that future writers may be able to properly distribute them to the species to which they more especially belong. **Aitchison**, in his *Catalogue of Panjáb and Sind Plants*, mentions three species—**D. sagittata**, **D. bulbifera**, and **D. sp.**, undetermined. Regarding the last he says that it is found near Hushyarpur and "yields a large tuber, much sought for at certain Hindu feasts. The ground where this grows is one mass of pits from the continuous digging for the tubers called *Thurí*." It has been repeatedly urged that much damage is done to young seedling trees by the deep pits dug throughout the forests while searching for yams.

Conf. with p. 128.

DETERGENT 504

Detergent.—**Stewart**, in his Notes on a Tour in Khághán, mentions the *Kriss* tubers as used for washing silk.

MEDICINE. Leaves. 505 Tubers. 506

Medicine.—The LEAVES of this species are sometimes spoken of as employed medicinally, having febrifugal properties assigned to them. The TUBERS are detergent and are utilized in dyeing (*Conf.* with **D. bulbifera**).

507

Dioscorea fasciculata, *Roxb.; Fl. Ind., Ed. C.B.C., 728.*

THE KIDNEY-SHAPED YAM; KAREN POTATO.

Vern.—*Súsní álu, sathui*, BENG.; *Suthni*, BIHAR; *Kangar*, POONA; *Kadwé-oo, ta-tway-u*, BURM.

References.—*Voigt, Hort. Sub. Cal., 652; Mason's Burm., p. 464, 813; Kurz, Prelim. Report, Pegu, XXII; Grierson, Bihar Peasant Life, 250; Firminger, Man. Gard., 122; Bomb. Gaz., XVIII., 56.*

Starch made from the Tubers. 508

Habitat.—"Cultivated to a considerable extent in the vicinity of Calcutta, not only for food but to make starch of the roots." (*Roxb.*) It is cultivated extensively by the Karens, and, being more like the potato than the yam, has acquired the name of the Karen potato or Tavoy potato. **Mason** adds: "I am not aware that it is ever found wild on the coast." **Kurz** mentions this species, in his *List of Pegu Plants*, but does not state whether gathered from a wild or cultivated stock. According to a writer in the *Bombay Gazetteer*, this species, known as *kangar*, is grown in Poona.

TUBERS. 509

Description.—The root consists of several small, smooth, light-coloured tubers, which are used by the natives for food and for the manufacture of starch. (*Roxb.*)

Mason describes this species as follows: "This is a small yam, not much larger than a kidney potato, which it much resembles both in appearance and taste." "It is the best vegetable we have, but unfortunately it can be obtained during a few months only in the year." The Poona yam referred to above is described as "closely resembling the *kon* (**D. alata**) and the *karanda* (**D. bulbifera**). It is found in the hills. Its bulbs, which form below the ground, are like a small sweet-potato in size and shape. The flesh is white and sweet" (*Poona Gaz.*, *XVIII.*, 56). **Firminger** remarks that the *súsní álú* is "a very distinct kind of yam; the tubers are about the size, form, and colour of large kidney potatos, and when well cooked bear a greater resemblance, in mealiness and flavour, to the potato than any other yam I know."

Conf. with p. 117 and p. 126.

Dioscorea glabra, *Roxb*, *Fl Ind*, *Ed C B C*, 729 — 510

THE CHINESE YAM

Vern — *Fddu tóka dumpa, nara tega*, TEL, *Ato sang*, SANTALI, *Kâteh, myouk mway* BURM

Sir Walter Elliot (*Fl Andh*, 129) remarks that the Telegu name means "Bullock s tail root," owing to the length of the tubers He further adds that *téga* is the tuberous root, *tige* the twining stem

References — *Kurz Pegu Report; Sir Walter Elliot, Flora Andh*, 49, 129, *Voigt, Hort Sub Cal*, 653, *Drury Hand-book Fl Ind*, III, 274

Habitat — A native of Lower Bengal and Sylhet

Food — The Rev A Campbell says this species is largely cultivated

FOOD TUBERS. 511 Bulbs. 512

D. globosa, *Roxb.*, *Fl. Ind*, *Ed. C B C*, 727, *Wight, Icon*, t 812. — 513

THE COMMON YAM

Vern — *Chupri álu*, HIND and BENG, *Bengo nári*, SANTALI *Chaina, chopri alu khaun phal, safed kanphal, myouk-phal*, BOMB, *Guna pendalam* TEL, *Pindalu*, SANS

References — *Voigt, Hort Sub Cal*, 652, *Dalz & Gibs*, *Bomb Fl*, *Supp* 92, *Mueller, Extra Trop Pl*, 106, *Firminger Man Gard*, 121, *Atkinson, Econ Prod N W P*, V 21, *Drury, U Pl*, 183, *Lisboa, U Pl Bomb*, 178; *Elliot, Fl Andh*, 65

Habitat — This species is largely cultivated, especially in parts of Bengal The tubers are roundish, sometimes very large, inside pure white No writer appears to have noticed the plant in a wild state in India, though it is common under cultivation, the *Bengo-nari* of the

Food — The TUBERS of this species are the most [illegible] yams, [illegible] in Indi[illegible] opinior[illegible] being [illegible] superior." The natives eat [illegible] They are often baked into br[illegible] are edible "Formerly larg[illegible] now almost entirely displace[illegible] are said to be planted in Jun[illegible]

FOOD. Tubers. 514

D nummularia, *Lamarck*, *Roxb*, *Fl. Ind*, *Ed. C.B.C*, 729 — 515

THE TIVOLI YAM

Vern. — *Bhora álu*, HIND and BENG, *Karu pendalam*, TEL

Habitat — A native of the neighbourhood of Calcutta, flowering time the close of the rains. Root tuberous, small.

The Kawan Yam of Fiji.

FOOD. Tuber. 516

Food.—The tuber appears to be unfit for human food, according to Roxburgh; but Mueller calls this the Tivoli Yam and describes it as "A high climbing prickly species, with opposite leaves. Roots cylindrical, as thick as an arm; their taste exceedingly good." These writers in all probability allude to different plants. Sir Walter Elliot (*Fl. Andh.*, 86) says the Telegu name given above is really applied to any wild species.

517

Dioscorea oppositifolia, *Linn.; Roxb., Fl. Ind., Ed. C.B.C.*, 729; [*Wight, Icon.*, 813.

Vern.—*Már-páspoli*, or *márapasapoli*, BOMB.; *Piska*, SANTALI; *Are tige* or *tégálu*, *avatenga tige*, TEL.; *Hiri-tala*, SING.

References.—*Voigt, Hort. Sub. Cal.*, 653; *Dalz. & Gibs., Bomb. Fl.*, 247; *Lisboa, Useful Pl. Bomb.*, 179; *Thwaites, Enum. Ceylon Pl.*, 326; *Sir Walter Elliot, Flora Andh.*, 16, 18; *Rev. A. Campbell, Econ. Prod.*, *Chutia Nágpur*; *Müeller, Extra-Trop. Pl.*, 107; *Drury, Hand-book of Indian Fl., III.*, 275; *Trimen, Cat. Ceylon Pl.*, 93.

Habitat.—A native of the east and west coasts of Southern India, extending north to Khandalla; of frequent occurrence in the sub-alpine forests. Flowering time the rainy season. Stems smooth, round, slender, twining, annual; leaves opposite, petioled, ovate-lanceolate, slightly cordate; inflorescence panicelled. Distributed to Ceylon and China.

FOOD. Roots. 518 Tubers. 519

Food.—The Rev. Mr. Campbell reports:—"The ROOTS and the ærial TUBERS are eaten, the former being considered by the forest tribes as a great delicacy." This remark probably refers to **D. bulbifera**—one of Mr. Campbell's specimens of *piska* is certainly **D. bulbifera**—Dymock enumerates this plant among those used during famine time in Bombay, both the tubers and the flowers being eaten.

FODDER. 520

Fodder.—In the Santal country cattle are said to eat the leaves.

MEDICINE. Root. 521

Medicine.—"The ROOT, ground and heated, is applied to reduce swellings: it is also used in snake-bite and scorpion sting."

522

D. pentaphylla, *Willd.; Roxb., Fl. Ind., Ed. C.B.C.*, 730; *Wight*, [*Ic.*, 814.

THE KAWAN YAM OF FIJI.

Vern.—*Kanta-álu*, HIND.; *Kanta álu*, N.-W. P.; *Taguna, takuli, maginá muniya*, KUMAON; *Kanta-alu, ulsi, shendorwel*, BOMB.; *Chata-veli, úlasi*, MAR.; *Vullie, kattu-vullie-kelangu*, TAM.; *Mullu peng-dalam, pandi mukku dumpa, konda-gummudu*, TEL.; *Nureni-kelangu*, MALAY.; *Pwá-sá-o, pho-sáo*, BURM.; *Katu-wala*, SING.

References.—*Voigt, Hort. Sub. Cal.*, 653; *Thwaites, En. Ceylon Pl.*, 325; *Dalz. & Gibs., Bomb. Fl.*, 247; *Rheede, Hort. Mal., VII.*, 34, 35; *Sir Walter Elliot, Flora Andh.*, 95, 115, 116, 118, 126, 131, 142, 144; *Dymock, Mat. Med. W. Ind.*, 2nd Ed., p. 843; *Atkinson, Him. Dist.*, 389 & 602; *Drury, U. Pl.*, 183; *Lisboa, U. Pl. Bomb.*, 179; *Birdwood, Bomb. Pr.*, 179.

Habitat.—Common in the jungles, on low hills throughout the greater portion of India.

Conf. with p. 135.

Wight remarks: "A sufficiently common species in jungles on low hills, &c., but never, so far as I have seen, cultivated, which is the more remarkable as I have always found the natives dig the tubers, whenever they had an opportunity to dress and eat them." Roxburgh says he has only seen this plant in its wild state. It occurs on the lower Himálaya ascending to 6,000 feet in altitude; is common a little below Simla.

Description.—The stems are prickly and furrowed, rather hairy; leaves digitately 5-divided, downy, segments oblong acuminate. The tubers oblong, large, and white, considered wholesome and palatable.

FOOD. Tubers. 523 Flowers. 524

Food.—Affords large edible TUBERS, eaten all over India. The FLOWERS are also eaten as a vegetable; they are sold in the bazars of Bom-

bay during the rainy season and are considered wholesome The LEAVES are also sometimes eaten during times of scarcity and famine

FOOD Leaves 525

Dioscorea pulchella, *Roxb , Fl Ind , Ed C B C , 728 , Fl Andh , 35 ,* see D bulbifera

D. purpurea, *Roxb , Fl Ind , Ed C B C , 727* — 526

THE PURPLE YAM

Habitat.—Cultivated in most districts of Bengal Ainslie says that

FOOD. Tubers 527

D. quinata, *Wall* — 528

Vern —*Magiya, muniya,* KUMAON

Habitat —Said to be met with in the North West Himálaya at altitudes of 6,000 feet

Food —Yields white edible tubers

FOOD Tubers 529

D. rubella, *Roxb , Fl Ind , Ed C B C , 727* — 530

Vern —*Guraniya alu goran alu,* BENG

References —*Voigt Hort Sub Cal , 652 Firminger, Man Gard , 122 Gaz Bengal, V , 307 , Atkinson Econ Prod N W P , V , 22*

about 5 7- leep

d by them as food "Fleshy and farinaceous, and may be used as an excellent substitute for potato, towards the close of the rains, when they come to perfection and the latter vegetable is dear" (*Gaz Beng , V , 307*) Firminger describes this as a "common but very excellent yam as good as any perhaps in cultivation The tuber is of a great size, crimson red on the outside, and of a glistening white within"

FOOD Tubers 531

D. sagittata, *Royle (non Poir)* — 532

Vern —*Tair, tarur, tagur,* KUMAON , *Tarur,* N W PLAINS

Habitat.—Met with in the North-West Himálaya

Food —The TUBERS are edible

FOOD. Tubers 533

D. sativa, *Linn , Kunth Enum Pl , V , 341* — 534

COMMON YAM

Vern —*Ratálu* HIND *Ato sang,* SANTALI , *Ratalú* PB *Chind gardi kaun phal* BOMB , *Gorkan, goradu,* MAR , DEC , *Ratalu (dhola = cultivated white form, al a coloured), yamskollung* GUZ , *Heggenasu,* KAN

Grierson (*Bihár Peasant Life*, 250) gives the following Bihârí names for what appears several species of Yam, though by him placed under **D. sativa**:—*Latar*, north of the Ganges; *ratar* to the west; *atár*, north-west; *kathár*, south-west; in Patna and Gaya *ratálu*; in Tirhoot *phar*; and to the east *khamharna*. While regretting inability to arrange these names under their correct botanical synonyms, there seems no doubt they are names for yams, and it is interesting to have to add that **Mr. Grierson** furnishes the Bihárí names for **Colocasia antiquorum** (the *kachchu*), as distinct from those above, which he says are yams.

References.—*Dalz. & Gibs., Bomb. Fl. Supp., 92; Stewart, Pb. Pl., 229; Drury, Hand-book Fl. Ind., III., 274; Year Book, Pharm., 1878, 275; Beyt's Gujarat Agri., p. 53, appears to be describing three cultivated forms of this species; Lisboa, U. Pl. Bomb., 178; Birdwood, Bomb. Pr., 179; Bomb. Manual, Rev. Accounts, 101; Gaz. of Mysore and Coorg, I., 55; Smith, Dic., 444.*

Habitat.—Cultivated over the greater part of India. **Dr. Dymock**, in a letter to the author, says there are several distinct varieties of this plant in Bombay. **Lisboa** remarks that it is "wild and cultivated in India and the Archipelago." **Dalzell** and **Gibson** state that it is "the most common species cultivated." Cultivated in Chutia Nagpur by the Santals.

MEDICINE. Tubers. 535

Medicine.—In the form of a powder it is used as an external application for ulcers.

FOOD. Tubers. 536

Food.—The TUBERS are eaten cooked as a common article of diet. In Bombay this is the most extensively cultivated species; of Gujarat it is said: "Three varieties of yam (*Ratálu*) are grown here, a long and a small white tuber—both called *dhola*, and a purple tuber, *lal*. They are alike generally raised on the ridges of ginger fields, irrigated and manured. Duration in the ground from seven weeks to two months." It is alluded to as cultivated in Rewa Kantha and Kathiawar. The "*ratálu*" is also said to be grown in Cawnpore, the seed for an acre being two maunds, and the produce 200 maunds. In the Hardoi Settlement Report (*p. 16*) it is stated that yam lands in the vicinity of towns fetch R50 an acre.

537

Dioscorea tomentosa, *Kœnig.; Roxb., Fl. Ind., Ed. C.B.C., 729; Wight, Icon., t. 815.*

Syn.—HELMIA TOMENTOSA, *Kunth*; and probably also D. TOMENTOSA, *Hohenhacker.*

Vern.—*Chenyel, chdyena*, BOMB.; *Subba dumpa*, TEL.; *Kyway pin*, BURM.; *Uyala*, SING.

References.—*Kurz, Prel. Report, Pegu, XXII.; Dymock, Mat. Med. W. Ind., 2nd Ed., 843; Sir Walter Elliot, Flora Andh., 169; Trimen, Cat. Ceylon Pl., 93.*

Habitat.—According to **Roxburgh** this is a native of the Circars, appearing in the rains. If the above synonyms be correct, it is possibly also a native of the West Coast of India at Travancore, Mangalore, &c.

FOOD. Shoots. 538

Food.—The young SHOOTS are eaten as greens in Bombay.

539

D. triphylla, *Linn.; Kunth, Enum., 392.*

Vern.—*Mándá*, MAR.; *Ts-iagri-nuren*, MAL.

References.—*Rheede, Hort. Mal., VII., t. 33; Dals. & Gibs., Bomb. Fl., 247; Dymock, Mat. Med. W. Ind., 2nd Ed., 843; Birdwood, Bomb. Prod.; Year Book, Pharm., 1878, p. 275.*

Habitat.—Common in the Concan and in Malabar.

MEDICINE. Tubers. 540

Medicine.—**Dymock** says the TUBERS are sometimes used to disperse swellings.

FOOD. Tubers. 541

Food.—The TUBERS are, according to **Graham**, intensely bitter and intoxicating. They are said to have been eaten in Bombay during times of

scarcity and famine. They have to be well boiled to destroy the acridity, but are even then not over-wholesome.

Dioscorea versicolor, *Wall.*

542

V., 98.

Habitat.—A native of the Eastern Peninsula, from Monghyr to ... Tavoy.

FOOD. Tubers and Bulbs. 543

... yam found in Kumáon (which he ... species) that it "occurs in these prov- ... stem and ROOT is eaten as a vege- ...

CONCLUDING REMARKS REGARDING YAMS.

Since the above was written, some interesting facts, in reply to a circular issued by the Government of India, have been received from the various local Governments. In most of the reports furnished, the attempt has ...

BURMA. Price. 544

MADRAS. 545

Nilwa pendalam. 546

just been received from the Conservator of Forests, Southern Circle, Madras, a passage from which may be here given: "There are a number of species of Yam, both wild and cultivated, in Southern India. Most of ...

pea to about 3 inches in length. These tubers are also eaten but are chiefly used for seed. The species to which they belong appears to be **D. alata**, called in Tamil *Katsjal kelangu* or *Perum-vullie-kalangu*; in Hindustani *Kam*, in Telugu *Nilunu*. There are also several armed species in all forests in South India—notably **D. pentaphylla** and **D. triphylla**. These bear thin, long, underground tubers, which are very

Kam. Conf. with p. 121 and p. 126. 547

stringy or fibrous but contain a lot of starch. The Yam is available only for three months in the year, and is not depended upon in the Arcot district as food to any great extent."

BENGAL. Conf. with Santal names. p. 120. 548

From Bengal a note has been received to the effect that the hill tribes of Chittagong cultivate several forms of Yam. The whole plant is said to be eaten: no statistics are available however, either as to the cultivated plants or the extent to which wild yams are eaten. Of Chutia Nagpúr it is reported that a "Dioscorea—the *Byong-kullú*, or *Pichkú* of the Kóls—is found in the Singbhoom District. The Kóls of Saranda eat the underground tubers called *byong* after cooking them in fire. They depend to a considerable extent on this food. The people of Saitba also eat yams called *Kullú* and *Pichka* after being roasted."

Pichku. 549 Byong. 550 Kullu. 551

552

DIOSPYROS, *Linn.; Gen. Pl.*, 665.

The name DIOSPYROS (celestial-fruit), was doubtless suggested for this genus of plants in allusion to the supposition that the fruit of D. Lotus may have been the oblivion-fruit of the ancients. The utmost difference of opinion, however, prevails as to the fruit which the heroes of the Odyssey ate, and perhaps DeCandolle is near the point when he says that, after all, Homer's Lotus-plant may have existed only in the fabled garden of the Hesperides.

The Sacred Lotus Flower, which plays so important a part in Oriental literature, is of course a water-lily and had nothing whatever to do with the Lotus-tree.

All the species of DIOSPYROS yield useful timbers, the best being the forms of Ebony. Gamble says of them collectively that all the species yield timber "with small pores, often in radial lines, and fine, very numerous, uniform and equidistant medullary rays, often closely packed. In most species there are numerous wavy, concentric lines across the rays. In several respects the structure of the ebonies resembles the structure of SAPOTACEÆ." The following enumeration of the better known species has been drawn up more on account of the timbers than the other economic facts attributed to them, and it has often been impossible to say more regarding even the wood than that it is used by the people and is viewed as good but inferior to certain other species. It is hoped, however, that the habitats will indicate the distribution of these useful trees, and that in future it may be possible to furnish definite information regarding each species (*Conf.* with the remarks under D. Ebenum).

553

Diospyros affinis, *Thwaites; Fl. Br. Ind., III.*, 566; EBENACEÆ.

References.—*Beddome, Fl. Sylv., Man.*, 145; *Ic. Pl. Ind. Or., t.* 127 *& p.* 26; *Thwaites, En. Ceylon Pl.*, 179; *Trimen, Sys. Cat. Ceyl. Pl.*, 52.

Habitat.—A middle-sized tree met with in the Tinnevelly hills and in Ceylon.

TIMBER. 554

Structure of the Wood.—Thwaites states that the timber obtained from this species is suitable for building purposes. Beddome remarks that it is a good building timber.

555

D. assimilis, *Bedd.; Fl. Br. Ind., III.*, 558.

Syn.—D. NIGRICANS, *Dalz. & Gibs., Bomb. Fl.*, 141 (not of *Wall.*); D. EBENUM, *Hiern.* (in part); *Bedd., Fl. Sylv.*, 65, under D. EBENUM.

Habitat.—A small tree of the Malabar coast and Kánara.

TIMBER. 556

Structure of the Wood.—This is said to closely resemble D. Ebenum, so much so as to have been confused with that species by Hiern. The plant is very imperfectlyknown, and little can, therefore, be ascertained regarding its economic properties. The notices under D. nigricans in *Lisboa's Useful Plants of Bombay*, and in the *Bombay Gazetteers*, should be read as descriptive of this species. Beddome remarks: "D. assimilis is very nearly allied to, if distinct as a species from, D. Ebenum; it differs,

forests, in the plains and on the Ghats

Diospyros Brandisiana, *Kurz, Fl Br Ind, III, 570* — 557

Reference — *Kurz, For Fl Burm, II 138*

Habitat — An evergreen tree met with in Upper Tenasserim

D. burmanica, *Kurz, Fl Br Ind, III, 565* — 558

Vern — *Te (Tai pen)* BURM

References — *Kurz For Fl Burm II 133, Gamble Man Timb, 248, Indian Forester VIII 416*

Habitat — A large tree (attaining a height of 60 feet) characteristic of the *Eng* forests of Burma

D. Candolleana, *Wight Ic, tt 1221 2, Fl Br Ind III, 566, non Thwaites, En Cey Pl, 181* — 559

Syn — DIOSPYROS HIRSUTA *Hiern* (in part) D ARNOTTIANA, *Miq*, D CANARICA, *Bedd Ic Pl Ind Or, t 134* and *For Man, 145* D OLIGANDRA, *Bedd* This tree has by many writers been confused with two Ceylon trees *viz* D HIRSUTA, *Linn f*, and D THWAITESII *Bedd* (the D CANDOLLEANA *Thwaites*)

References — *Beddome Fl Man 144* (D canarica, *Bedd*) *Ic Pl*

ripening in the rains

D. Chloroxylon, *Roxb, Fl Br Ind, III, 560* — 560

Syn — D TOMENTOSA, *Lamk (not Roxb)*, D CAPITULATA *Wight, Ic, tt 1224 1588*

Vern — *Anduli* GOND *Ni rai* BOMB, *Illinda, pedda illinda, togarike aulanche illinda, ulimera* TEL

References — *Roxb, Fl Ind Ed C B C 415 Corom Pl I, 38, t 49, Voigt Hort Sub Cal 344 Brandis For Fl, 297 Gamble Man Timb 248, Dalz & Gibs Bomb Fl, 140, Sir Walter Elliot Flora Andh, 70 148 150 183 186 Indian Forester II, 179 XII 313, Lisboa, U Pl Bomb, 93 164, Royle Ill Him Bot, 262, Balfour, Cyclop, 958*

Habitat — A middle sized tree met with in the Deccan Peninsula to Orissa Particularly common about Surat and in the district of Násik Wight mentions the Balaghat mountains, Madras Is said to be a shrub in the Godavari forests

Food — Fruit globose, size of a large pea, eaten when ripe, and is reported to be very palatable (*Lisboa*) — FOOD. 561

Structure of the Wood — Hard durable, and yellow-coloured Lisboa says it is useful for various purposes Balfour remarks that this tree affords a very hard useful wood — TIMBER. 562

D cordifolia, *Willd, Gamble, Man Timb 251* — 563

Syn — D MONTANA *Roxb* (in part) which see

564 **Diospyros crumentata,** *Thw.; Fl. Br. Ind., III., 567.*

Vern.—*Chemel-paniché* (TAM. in Ceylon).

References.—*Thwaites, En. Ceylon Pl., 179; Balfour, Cyclop., 952.*

Habitat.—A large tree met with in Ceylon, and probably only a variety of D. affinis.

565 **D. dasyphylla,** *Kurz; Fl. Br. Ind., III., 554.*

Reference.—*Kurz, For. Fl. Burm., II., 139.*

Habitat.—An evergreen tree with the branches densely fulvously villous. Met with on the Martaban hills, Burma, at a height of 4,000 feet in altitude.

566 **D. densiflora,** *Wall.; Fl. Br. Ind., III., 570.*

Reference.—*Kurz, For. Fl. Burm., II., 134.*

Habitat.—An evergreen glabrous tree, met with occasionally in the tropical forests of Moulmein, Arakan, Martaban, and Tenasserim.

567 **D. discolor,** *Willd. (A. DC., Prod., VIII., 235).*

Syn.—D. MABOLA, *Roxb.*

Habitat.—A small tree, native of the Philippine Islands, introduced into India and cultivated in gardens, especially in Vizagapatam.

FOOD. Fruit. 568

Food.—The FRUIT is like a large quince, and in some places is called Mangosteen: its proper name should be the Mabola fruit. It is agreeable, and has a pink-coloured fleshy rind.

569 **D. Ebenum,** *Kœnig.; Fl. Br. Ind., III., 558; Wight, Ic., t. 188.*

EBONY.

Syn.—D. EBENASTER, *Roxb., Fl. Ind., non Retz.*

Vern.—*Ebans, abnús, tendu,* HIND.; *Kendhu,* or *khenda,* URIYA; *Tendú, temrú,* C. P.; *Tai, tendu, abnús,* MAR.; *Acha, nullúti, tumbi, shengú-tan, kaka-tati, tai,* TAM.; *Tuki, tumbi,* TEL.; *Kare,* KAN.; *Karunkáli, chara, acha* (TAM. in Ceylon); *Kaluwara,* SING.; *Mallali,* MANJARABAD. This is the εβένος of the Greeks and the *ebenus* of the Latins. (*Conf. with Dios., I., 114; Pliny, 16, 40.*)

References.—*Roxb., Fl. Ind., Ed. C.B.C., 412; Voigt, Hort. Sub. Cal., 344; Brandis, For. Fl., 296; Beddome, Fl. Sylv., t. 65; Gamble, Man. Timb., 251; Thwaites, En. Ceylon Pl., 180; Grah., Cat. Bomb. Pl., 108; Müeller, Select Ex-trop. Pl., 108; Trimen, Sys. Cat., Ceylon Pl., 52; Moodeen Sheriff, Supp. Pharm. Ind., 132; Dymock, Mat. Med. W. Ind., 2nd Ed., 485; Indian Forester, III., 23, 203; VII., 128; VIII., 29; IX., 349; X., 23, 31; XIII., 172; Royle, Ill. Him. Bot., 262; Reprint No. 25, Records of Pub. Works Dept., 1871, p. 48; Balfour, Cyclop., 952; Treasury of Bot., 411; Kew Off. Guide to the Mus. of Ec. Bot., 37; Kew Off. Guide to Bot. Gardens and Arboretum, 43, 68; Settlement Reports: Chindwara, C. P., 110; Nimar, 305; Shajehanpur, IX.; Gazetteers: Kánara, XV., 67; Mysore and Coorg, I., 46, III., 16; Madras, Man. Adm., I., 313; Man. Cuddapah, 262; Orissa, II., 5.*

Habitat.—A large tree of the Southern Konkan (Kánara) to Madras (Circars and Carnatic), Ceylon, and the Malaya. The utmost confusion exists in the writings of popular authors regarding this tree, it being generally assigned to Ceylon, and the Indian Ebony spoken of as the product of D. melanoxylon or of D. Ebenaster, thus implying that the true Ebony does not occur in India. By botanists D. Ebenaster, however, is viewed as a synonym for D. Ebenum. Lisboa (*Useful Plants of Bombay*) makes no mention of D. Ebenum or Ebenaster as occurring in

the Bombay Presidency, and Dr Gray says it is a native of Ceylon On the other hand, Mr. Talbot describes the plant as a forest tree in Kanara and adds that it is "one of the trees which are not allowed to

GUM 570

MEDICINE. 571

ingent, it was

TIMBER. 572

sses of treaks

Roxburgh says of Ebony "There are many species of this extensive genus, which yield a hard, black wood—I mean pure intensely black (not variegated), to all of which we give the general appellation Ebony my **D melanoxylon** is one *The species I am now describing*" (D Ebenaster, *Willd*) "a second, Ebenus, *Rumph, Amb, Vol 3, Pt I, t 1*, seems a third From all these I know that of the Mauritius differs essentially by the entire fruit, with ripe seed, just received from that island, and now before me The mountains of Bengal, Bhutan, and Nepal

573

TRADE. 574

occurs, "that given by **D melanoxylon** in the Circar forests and **D tomentosa** in those of the Deccan are more largely used, though but little is really exported, but the **D melanoxylon**, *Roxb*—or Coromandel Ebony—is very largely used" (*Conf* with the account under **D melanoxylon** on a further page)

The writer has failed to discover any report dealing comparatively with Indian, Ceylon, Mauritius, and other Ebonies It would, for exam-

DIOSPYROS Ebenum.

The Ebony-Woods.

TRADE.

there are five commercial Ebonies, and "of these the Mauritius wood is esteemed the best, and is probably the produce of the same tree as the Indian Ebony, *viz.*, **Diospyros Ebenum.** [This would *not seem* to be correct.—*Ed.*]. "The chief Indian and Ceylon Ebonies are **D. melanoxylon**, common in most provinces; **D. Ebenum**, of South India and Ceylon; **D. Kurzii**, the Andamanese Marble-wood, or *Teakah*, and **D. quæsita**, the Calamander wood of Ceylon. The price of Ebony in England is usually about £10 to £20 per ton, equivalent, at 50 cubic feet per ton, to four to eight shillings a cubic foot. The difficulty about Ebony is the small quantity of black heart-wood given by the common **D. melanoxylon**, and it is probable that the sale of whatever Ebony may be available will be better made at the Indian ports than in Europe. But the Andaman marble-wood should sell well if sent to Europe, and more especially as it can probably be obtained of larger size than ordinary Indian kinds" (*Vol. VII.* (*1881-82*), *p. 128*). The above, which is the only lengthy reference in the *Indian Forester* on the subject of Ebony, falls, as it seems to the writer, considerably short of the chief point to be aimed at in an effort to develop a trade in this valuable timber from India. It does not appear enough to say that the difficulty about Ebony is the small quantity of black heart-wood. It is necessary to know if this is a more adverse circumstance in India than in Ceylon and other ebony-producing countries. Unless it be contended that the produce of **D. melanoxylon** is commercially of equal value to that of **D. Ebenum**, that timber should be excluded from consideration, and the possibilities or otherwise of India becoming a source of true Ebony ought to be disposed of first, before the attempt is made to place on the market Ebony substitutes. Indeed, the various opinions recorded by authors regarding the Ebony from **D. melanoxylon** do not favour the idea that it is of equal value to that from **D. Ebenum**. This subject is worthy of consideration in its widest aspect. When it has been demonstrated that **D. Ebenum** produces an inferior or less remunerative Ebony in India than it does in other countries, it might then become desirable to foster the cultivation and trade in some of the other Ebony-yielding species. But until this has been demonstrated it would seem opposed to a possible trade in Indian Ebony to palm off all available black-woods as Ebonies. These may in themselves be good timbers for some purposes, even superior to Ebony, but success is more likely to follow an accurate declaration of their characters and properties than by taking advantage of commercial generalisations. But it cannot be stated that the timbers from Indian species of **Diospyros** have as yet been critically examined, and as Ebony is daily becoming more scarce in the European markets, it might be in the interests of this country to attempt the protection and possibly the cultivation of good species either indigenous to or found suitable for India.

DOMESTIC USES. Turnery. 575 Inlaying. 576 Cabinet-Work. 577 Piano-Keys. 578 Furniture. 579

It is scarcely necessary to mention here the numerous purposes to which Ebony is put. It is in great demand for ornamental turnery, for inlaying in fancy articles, cabinet-work, and for the keys in pianos, &c., &c. Gamble gives the weight of the Indian true Ebony as ranging from 61 to 70lb a cubic foot. Beddome regards it as considerably higher. He says: "**D. Ebenum** yields the best kind of Ebony, generally jet-black, but sometimes slightly streaked with yellow or brown; it is very heavy, close, and even-grained, and stands a high polish; unseasoned it weighs 90—100lb the cubic foot and 81lb when seasoned, and has a sp. gr. 1·296; it is used for inlaying and ornamental turnery, and sometimes for furniture, but there is not much demand for it in this presidency. The sapwood is white, hard, close-grained and strong but not durable; at the same time it is used by the natives for various purposes. It is called *Nalluti* in Cuddapah and the Karnúl hill forests, where the tree is very

common and well-known" In *Spons' Encyclopædia* it is stated that the approximate London market values are £5—20 a ton for Ceylon and £3—12 for Zanzibar, &c

Diospyros ehretioides, *Wall , Fl Br Ind , III , 559* — 580

Vern —*Ouk chingsa, aukchinsa* BURM

References —*Kurz, For. Fl Burm , II , 129, Kew Off Guide to the Mus of Ec Bot , 93*

Habitat —A large tree frequent in Burma

TIMBER. 581

posts

D. Embryopteris, *Pers , Fl Br Ind , III , 556, Wight, Ic , tt , [843, 844* — 582

Syn —D GLUTINOSA, *Kœn Roxb Fl Ind , Ed C B C , 413* EMBRYOPTERIS GLUTINIFERA *Roxb , Cor Pl , I , 49, t 70*

References —*Roxb , Fl Ind , Ed C B C , 413, Coro Pl , I t 70 Voigt,*

Habitat.—A dense evergreen small tree, with dark-green foliage and long shining leaves, common throughout India and Burma, except the

arid and dry zones in the Panjáb and Sind.* Distributed to Ceylon, Siam, and the Malayan Peninsula. Very abundant in Bengal. The Conservator of Forests, Northern Division, Bombay, states that in his division **D. Embryopteris** is not known. **Wight's** figures were made from specimens "found in Malabar." The Madras Board of Revenue, in a report furnished for this work, reports that, while the tree is known in some of the forests of the Presidency, especially the Northern Circars, it is not supposed to be used for tanning purposes or to pave the bottoms of boats.

GUM. 583

Gum.—Considerable confusion exists on the subject of the gum or resin obtained from this tree. **Cooke** describes it as "dark brown, rather earthy looking, with a bright resinoid fracture, not unlike some light-coloured varieties of the black dammar. A similar specimen in the reference collection is a brown resin, with a shining fracture, externally coated with a greyish white or brownish crust. It is somewhat stalactitic as if it had trickled down the tree as it was exuded." Again: "The resin in the collection referred to this source was derived from Bhaugulpore; it is soluble in turpentine or benzole, forming a limpid varnish." Although many writers speak in general terms of a gum as obtained from this plant, they do so in such a manner as to suggest a possible confusion between a true gum and a prepared extract from the fruit. The writer cannot recollect having observed a gum exuding through the bark of **D. Embryopteris**, and neither **Stewart, Brandis, Gamble, Beddome,** nor **Kurz** mention a gum, though of course they all allude to the "viscid pulp, which is used as gum in book-binding, and in place of tar for paying the seams of fishing-boats. Its use for 'gabing' boats is general throughout the rivers of Lower Bengal and Assam. An infusion is used to render fishing-nets durable. It is full of tannin and is used in medicine as an astringent" (*Gamble*). **Dymock** writes: "The extract of the fruit is of the colour and consistence of shell-lac." An extract is thus prepared in some parts of the country which might, as in the case of Cutch, closely resemble a resin. It thus may be the case that the passage quoted above from **Dr. Cooke's** Report on Gums and Gum-resins, &c., refers to the extract, but what seems more likely the case, it is the description of a true gum but not a product from **D. Embryopteris**. Some time ago information was called for by the Department of Public Works on the subject of gums and the replies obtained from every Province were in 1871 printed in the form of a combined report. From nearly every district of India some mention was made of the substance now under consideration, but in no instance was the tree stated to yield a gum. Of Assam it was stated: "The *Kendú* tree fruit yields a resinous gum: it is used for caulking the small canoes. The Dome fishermen colour their nets with it, and thereby render them more durable in wear and tear." So again the Commissioner of Dacca wrote: "There is no resinous product which is extensively used except the preparation of the *Gáb* tree." The Commissioner of the Presideney Division, Bengal, stated that "A decoction of the unripe gáb fruits is used for caulking boats." The above passages are representative of the whole series of replies. No mention is made of a gum but the use of the decoction, extract, or fresh pulp of the unripe fruit is general, at least over the Lower Provinces. **Mr. Baden Powell**, in a review of **Dr. Cooke's** report on Gums (*Indian Forester, II., 179*), after discussing the properties of the viscid pulp, adds: "If the fruit is meant in the text, we have neither gum nor resin properly so called to deal with. Forest Officers and others who have the opportunity of studying **D. Embryopteris** would render a valuable service by looking up the matter of gum or no gum, and thus remove a perplexing

RESIN. 584

* It flowers in March to May and the fruits ripen about December.

RESIN.

cause of ambiguity from the literature of this subject" After having ascertained whether or not the tree exudes from its stem-bark or rind of

extract is reported to be prepared, or only a decoction The former would mean that the fruits were boiled and the juice thus obtained boiled down to a tarry or resinous consistence Of Orissa (Khorda sub-division) it has been reported that the fruits do not seem to be in demand No use

DYE. Fruit. 585 TAN. 586

Dye and Tan —The FRUIT is largely used as a TAN, being a powerful astringent By simply steeping the half ripe fruits in water a brownish liquid is obtained, which is sometimes used in dyeing a brown colour This is made into a good black by being combined with Myrobalans (Terminalia Chebula) and Proto-sulphate of iron (*hirakash*) As a dye this substance is, however, of small importance Wardle (in his recent

nets and lines A very considerable trade is done in cutch exported to Europe to be used by the home fishermen for a similar purpose. The comparative merit of *gáb* and cutch does not seem to be ... out but ...

... nd 4s and 10½d, as ... but the Professor adds that the

dried fruits are somewhat tough and consequently difficult if not impossible to grind. An extract should be prepared in India if the attempt be thought desirable to introduce the tan to European commerce.

For further chemical analysis and percentage of tannic acid, see concluding sentences of the paragraph below on the Medicinal properties of *gáb* fruit.

OIL. 587

Oil.—An oil, extracted from the seed by boiling, is used in native medicine.

MEDICINE. Fruit. 588 Bark. 589 Juice. 590 Oil. 591

Medicine.—The FRUIT and the BARK both possess astringent properties. The JUICE of the unripe fruit makes a good application to fresh wounds. It is rich in tannin, and is therefore a useful domestic astringent, and the tree is so plentiful as to be at the door of even the poorest cotter. An OIL extracted from the seeds is also employed in native medicine. It is used in dysentery and diarrhœa with success. The infusion of the fruit is given as a gargle in aphthæ and sorethroat (*Kani Lal De Bahadur*). Dr. Dymock gives the following brief history of the medicinal uses of *gáb*: "The circumstance that the unripe fruit abounds in an astringent viscid juice, which is used by the natives of India for daubing the bottoms of boats, was communicated by Sir William Jones to Roxburgh in 1791. The introduction of the fruit into European practice in India is due to O'Shaughnessy. In 1868 it was made officinal in the *Pharmacopœia of India*. In Bombay the fruit is eaten by the poorer classes. The SEEDS are preserved by the country people and given as an astringent in diarrhœa. The testa is the astringent part, the albumen being almost tasteless." Ainslie, speaking of the fruit, says: "On being punctured, it gives out a juice of peculiar astringency, and which the Hindú doctors sometimes employ as an application to fresh wounds." The *Pharmacopœia* recommends the drug to be exhibited in the form of an extract prepared from the expressed juice over a water-bath. It is "of a reddish brown colour, in flexible plates, and readily soluble in water. It is an excellent astringent and very useful in diarrhœa and chronic dysentery. A solution of two drachms in a pint of water is a valuable vaginal injection in leucorrhœa." In a further page the *Pharmacopœia* explains that the reputed value of this drug rests mainly on the testimony of Sir W. O'Shaughnessy, but it adds: "There is little doubt that it possesses powerful astringent properties, and is deserving of a high place amongst indigenous remedies of this class." Dr. Dymock points out that the Diospyros fruit is intensely astringent until quite ripe, when it suddenly becomes mawkish and sweet without a trace of its former astringency. This is noticed in the 'Pharmacographia,' but not in the Indian Pharmacopœia, where unripe fruit should have been ordered." This fact is of very considerable importance and must account for the varying percentage of tannin found in the fruits by different chemists. O'Shaughnessy is said to have found 60 per cent.; Professor Hummel (see paragraph on Dye and Tan above) found only 15 per cent. It would be most instructive to have the fruits in all stages of their growth chemically analysed, since it would seem that both as a drug and a tan opinions founded on imperfect materials have become current in the literature of this subject.

Seeds. 592

SPECIAL OPINIONS.—§ "According to O'Shaughnessy the juice of the unripe fruits contains 60 per cent. of tannic acid. The bark has been used with doubtful results in the treatment of intermittent fevers" (*Dr. Warden, Prof. Chemistry, Calcutta*). "The expressed juice abounds in tannin and is used in cases of diarrhœa, dysentery, and hœmorrhage from internal organs" (*Civil Surgeon J. H. Thornton, B.A., M.B., Monghyr*). "The pulp of the ripe fruit is sweet and astringent in flavour, and may be moderately used in ordinary cases of diarrhœa and dysentery" (*Civil Surgeon Bankabehary Gupta, Pooree*).

FOOD.

Food.—Produces a round fruit as big as a middle-sized apple, green when unripe, rusty yellow when ripe; and in the latter stage contains a [illegible]

Fruit. 593

Leaves. 594

[illegible]

TIMBER. 595

[illegible] moderately hard, close-grained [illegible] average quality and is used for building purposes. Also that masts and yards of country vessels are made from this tree in Ceylon

DOMESTIC. 596

Domestic Uses.—Ainslie mentions that the carpenters of the Malabar coast use the juice of the fruit "as an excellent glue"

Diospyros exsculpta, *Ham*, see **Diospyros tomentosa**, *Roxb*; **D. exsculpta**, *Bedd.*, see **D. melanoxylon**, *Roxb.*, var. **Beddomei**; and **D exsculpta**, *Dalz.*, see **D. Tupru**, *Buch.-Ham.*

597

D. flavicans, *Hiern*; *Fl. Br. Ind., III., 562.*

Habitat.—A small tree, native of Mergui, Tavoy, Tenasserim, and Malacca.

598

D. foliosa, *Wall.*; *Fl. Br. Ind., III., 556.*

Syn.—Diospyros calycina, *Bedd.*

Vern.—*Tellay toverey*, Tam.

References.—*Bedd., Fl. Sylv., t. lxvii.*

Habitat.—A middle-sized tree, native of the Western Ghâts, Madras. Beddome says it occurs in the Tinnevelly District and southern portions of Madura. Very abundant in the Ghât forests from the foot up to 3,000 feet elevation.

TIMBER. 599

Structure of the Wood.—Yields a valuable light-coloured wood, which is much in use in the Tinnevelly District (*Beddome*).

D. glutinosa, *Roxb.*, see **Diospyros Embryopteris**, *Pers.*

600

D. Kaki, *Linn. f.*; *Fl. Br. Ind., III., 555*; *Wight, Ic., t. 415.*

Sometimes called the Chinese Fig and Plum or the Kaki Fig of Japan.

Syn.—Diospyros chinensis, *Bl.*, Embryopteris Kaki, *Don*; D. [illegible], *Rev Hort*

Vern.—[illegible]

Re[illegible]

[illegible]

Burma [illegible] ur into the Karens [illegible] clusively with Teh [illegible] Roxburgh first [illegible] sequently he added [illegible] the northward of [illegible] plants grown in the Botanic Gardens, Calcutta, had in twelve years only attained a height of 12 to 15 feet.

DYE. 601

Dye.—*In* Japan black dyes are produced from the fruit of this tree with sulphate of iron.

FOOD. Fruit. 602

Food.—Cultivated on account of its FRUIT which is about the size of a small apple, the better qualities being described as delicious and often made into preserves. Roxburgh says: "The fruit is tolerably pleasant, though by no means equal to a good apple, but what is worse, the trees about Calcutta are uncommonly unproductive." Balfour writes that the fruit in Japan and China "attains the size of an orange, and is frequently sent to Europe in a dried state. Preserved in sugar, it is a large thin-skinned, juicy fruit of an orange yellow colour, with a sweet taste."

603

Diospyros Kurzii, *Hiern.; Fl. Br. Ind., III., 559.*

ANDAMANESE MARBLE WOOD.

Vern.—*Teakah, thitkya,* BURM.; *Pecha-da,* AND.

References.—*Kurz, For. Fl. Burm., II., 231; Gamble, Man. Timb., 249; Indian Forester, IV., 292; V., 186; VII., 128; X., 532; Smith's Dict. Econ. Pl., 267; Balfour, Cyclop., 953; Kew Off. Guide to the Mus. of Ec. Bot., 93; Kew Bulletin, Sept. 1887, p. 19.*

Habitat.—A large evergreen tree of the Andaman and Nicobar Islands.

TIMBER. 604

Structure of the Wood.—Handsome, streaked with black and grey; the grey wood hard; the black wood very hard, with alternate streaks of black ebony and grey. The mass of ebony occupying the centre of the tree is large and very irregular in outline, and frequently encloses interrupted concentric belts of light-coloured wood. At the Conference on Indian Timbers held in the Commercial Rooms of the Colonial and Indian Exhibition, Sir D. Brandis explained the properties of this timber. To the question as to the sizes of logs available, he replied that planks of 12 to 15 inches would, in his opinion, be the maximum. The gentlemen present at the conference thought that if the supply were regular a good demand for the wood might be expected. Pieces of furniture made of it were exhibited, which seemed to justify the idea that it might come into use for fancy cabinet-making.

Furniture. 605

Cabinet-Work. 606

Sheaths. 607

In India it is sparingly employed for furniture, but a considerable demand exists for walking sticks made of this wood. It seems to deserve to be better known as a substitute for the Ceylon Calamander wood, which it resembles in appearance very much. It is said by Major Ford to be used in the Andamans for handles and sheaths of blades, and for furniture. Home's survey gave 224 trees, or one tree per acre; so that it is fairly abundant.

608

D. lanceæfolia, *Roxb.; Fl. Br. Ind., III., 562.*

Syn.—DIOSPYROS MULTIFLORA, *Wall.*

Vern.—*Gúlul,* SYLHET (see under **D. Toposia**).

References.—*Roxb., Fl. Ind., Ed. C.B.C., 414; Brandis, For. Fl., 297; Atkinson, Him. Dist., 364, 524; Kurz, For. Fl. Burm., II., 136.*

Habitat.—A fairly large tree met with in Sylhet, the Khásia hills and Moulmein; flowers in March.

FOOD. Fruit. 609

Food.—Roxburgh says the FRUIT is eaten by the natives.

TIMBER. 610

Structure of the Wood.—The tree furnishes the natives with hard durable timber used in the construction of their habitations (*Roxburgh*).

611

D. Lotus, *Linn.; Fl. Br. Ind., III., 555.*

THE EUROPEAN DATE PLUM: Sometimes also called the GREEN [EBONY TREE.

Vern.—*Amlok, malok,* HIND.; *Amlúk* (or *amlok*), *malúk* (Jhelum Valley), *bissarhi pála* (Bias Valley), PB.

References.—

Habitat.—A middle-sized tree of the northern parts of the Panjáb, ascending the Himalaya, and extending into Kashmir, Afghánistan, and Beluchistan Probably only cultivated in India Stewart says it is a handsome little tree not uncommon in the western part of the Jhelum basin,
parts of the
atsakh (6,000
arts of Hazara
the male plant is called *Gwalidar* and the female *Amlok*

RESIN 612

FOOD Fruit 613

Peshawar, but had not seen the plant up to the date of his visit to Hazára He continues "Subsequently, the writer got it growing abundantly in many places throughout Hazara, from 3,500 to 6,000 feet, and in 1860 on the return journey from Kashmir, in the Upper Jhelum valley below Baramula. The fruit is sweetish and pleasant enough in taste
In the Hazára
are produced
hat the tree is
es that, according
used in *sherbats*. "I presume Irvine was mistaken in stating that ...

in the *Indian Forester*, Dr Aitchison adds that the Lotus fruit is considered next in value to the walnut. It is said to be purple in colour and to be about the size of a cherry or pigeon's egg (*Conf.* with generic introduction and the remarks under D melanoxylon)

TIMBER. 614

Structure of the Wood.—Grey, moderately hard, close-grained Stewart remarks that the tree is nowhere in India so abundant as to afford timber

615

Diospyros melanoxylon, *Roxb.*; *Fl Ind.*, ii, 530; *Fl Br Ind*, [*III*, 564

COROMANDEL EBONY

Syn.—DIOSPYROS WIGHTIANA, *Wall*; D DUBIA, *Wall*; *Wight, Ic*, t 1223. By Brandis, Gamble, Atkinson, and many other writers this is made to include D TOMENTOSA, *Roxb*, the result being that in all probability the economic facts and vernacular names given by these authors for the species met with in Bengal and the N W Provinces should be removed from D MELANOXYLON, and carried to D TOMENTOSA Not being able to verify each fact the writer has felt it preferable, however,

to leave for future enquiry the dissection and redistribution of the information here given and that which will be found under D. TOMENTOSA.

Vern.—*Tendu, kendu, temru, abnús*, HIND.; *Kend, kyou (kiu)*, BENG.; *Gora tiril*, KOL.; *Terel, kiril*, SANTAL; *Kendhu*, URIYA; *Kend*, MAL (S. P.); *Tumri, tummer, tumki*, GOND.; *Tendu*, BAIGAS; *Tendu*, C. P.; *Timberni, temru, tumri, tumbúrni* (Beddome), BOMB.; *Tumri, temru, timburni*, MAR.; *Támrug* (Baroda), *timburni* (Panch Mahals), *támrug*, GUZ.; *Balai*, KANARA; *Tembhurni*, THANA; *Tumbi, tumbali, karunthumb*, TAM.; *Tumi, tumki*, or *tunki* (Beddome), *tumida, timmurri, damádi*, TEL.; *Balai*, KAN.; *Ouk-chin-ya* (according to Balfour), BURM.; *Kenduka*, SANS.; *Abnús*, ARAB.

Abnús is given in the Jangira *Gazetteer* as the Konkan name for this species; it is called *temburni* in Kolába. Mr. J. F. Duthie points out that the *Tendu* of Northern India is D. tomentosa, *Roxb.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 412; Voigt., Hort. Sub. Cal., 344; Brandis, For. Fl., 294, in part not Blume; Beddome, Fl. Sylv., t. 67; Aitchison, Cat. Pb. and Sind Pl., 86; Pharm. Ind., 132; O'Shaughnessy, Beng. Dispens., 428; Dymock, Mat. Med. W. Ind., 485; Bidie, Cat. Raw Pr., Paris Exh., 33; Atkinson, Him. Dist., 364; Lisboa, U. Pl. Bomb., 92, 164; Birdwood, Bomb. Pr., 332; Royle, Ill. Him. Bot., 262; McCann, Dyes and Tans, Beng., 128, 135-36, 152, 159; Buck, Dyes and Tans, N.-W. P., 44, 79; Balfour, Cyclop., 953; Treasury of Bot., 411; Kew Off. Guide to the Mus. of Ec. Bot., 93; Journ., 1867, Pt. II., 2, 80; Bomb. Gaz., XV., 67; VII., 36; For. Adm. Report, Ch. Nagpur, 1885, 6, 32; Gazetteers, Bombay (Panch Mahals), III., 201; VII., 31, 32, 36; XI., 25 and 404; XIII., 27; XV., Pt. I., 67; XXV., 92, 164, 348, and 389.*

Habitat.—A large tree, attaining a height of 60 to 80 feet, sometimes seen as a shrub. Roxburgh mentions it as a native of "most woody mountainous countries in India, *viz.*, Ceylon, Malabar, Coromandel, Orissa, &c." It is said not to be met with in Burma (*Kurz, Brandis*). It seems probable that this species should be described as the Western representative, just as D. tomentosa might be said to be the Eastern and Northern Indian form. The *Flora of British India* retains these Rox-burghian species as distinct, but many Indian authors view them only as forms of one and the same species. Lisboa says of D. melanoxylon that it "is not uncommon in Bombay, North Kánara, and the Madras forests, extending northwards as far as the Raví. It attains a height of 30 to 50 feet, sheds its foliage in the cold season, renews and flowers in the hot season, and ripens its fruits during the rains." The plant met with in the Raví basin is most probably D. tomentosa not D. melanoxylon. According to Wight the latter plant is met with on the Nilghiris and Serramalli hills near Dindigul. The Madras Board of Revenue assign it, however, to the Eastern Ghâts and hills of Kurnool, so far as the Madras Presidency is concerned. It is also said to be very common in Thana in Bombay. A recent report furnished by the Forest Department of Bengal speaks of it as found in Singbhoom. It attains a girth of about 6 feet. The timber might be obtained from Madras.

616

Var. Beddomei=D. exsculpta, *Bedd.* (not *Ham.*). Some doubt exists regarding this plant. The description of it given in the *Fl. Br. Ind.* is based on Beddome's plate (*Fl. Syl.*, 66). Beddome remarks that it is found in the Cuddapah, Salem, and Karnul forests, and probably elsewhere in the Madras Presidency. He adds that it is found also in Bengal and Bombay, but this last statement most probably rests on the identification of the Madras variety with D. exsculpta, *Ham.*, a synonym for D. tomentosa, *Roxb.*

GUM. 617

Gum.—Like D. Embryopteris, this species is reported to yield a gum, but nothing of a definite nature can be discovered regarding that gum and its existence may be doubted. Indeed, in the writer's opinion, it is highly

doubtful if any **Diospyros** yields a gum or resin, though the fruits of all would most probably afford a resinoid juice.

MEDICINE. Bark 618

Medicine —The BARK possesses astringent properties, and is used in decoction in diarrhœa and dyspepsia as a tonic In a dilute form it is used as an astringent lotion for the eyes Roxburgh says that the bark, powdered and mixed with pepper, is given for dysentery

FOOD. Fruit. 619

Food —The tree flowers in April and May, and produces a FRUIT which, when ripe, is eaten by the natives It seems probable that the fruit of this tree is often confused with that of **D. tomentosa.** Roxburgh's description of these two fruits may be here given **D. melanoxylon** berry round, of the size of a small apple, yellow, pulpy, seeds as many as 8, immersed in the pulp, kidney-shaped, sharp on the inner edge **D. tomentosa:** berry ovate, as large as a pigeon's egg, covered with a smooth hard bark, which becomes yellow when ripe, and is filled with a soft, yellow edible pulp. The fruit of **D. melanoxylon** by some writers is said to have an astringent taste, not palatable But by others "The fruit when perfectly ripe has a pleasant taste and is much liked" (*Kanara*) "The fruit is of the size of a plum" It is "gathered chiefly by the Naik-

TIMBER. 620

to distinguish It is used for buildings, shoulder poles, and carriage

is known as *temru*, the wood being used for legs of beds, &c It is reported to be one of the best timbers in Seone (Central Provinces) and to be plentiful in all parts of the Upper Godavery District. In Raipore, there are stated to be "noble forests of *tendú*" This is viewed as one of the best timber trees of Puri Dr. Gray says that it is plentiful in the

TIMBER.

It is heavy, close, and even-grained, and takes a fine polish" (*Lisboa*). "The black heartwood of old trees is used for cart-wheels and for bracelets."

DOMESTIC. 621

Conf. with B 327. Bidis. 622

Domestic Uses.—The black wood, in place of "Sandal-wood, is ground into a paste and smeared over the face and body after worshipping the gods. The LEAVES, like those of the *ápta*, are so much used in rolling cigarettes that *ship-loads are every year sent to Bombay*" (*Thana Gas., XIII., Pt. I., 27*). In a recent report on the subject of BIDIS (these cigarette covers) Mr. A. T. Shuttleworth says that "a considerable revenue is realised by their sale."

623

Diospyros microphylla, *Bedd.; Fl. Br. Ind., 559.*

Syn.—DIOSPYROS BUXIFOLIA, *Hiern.*; D. VACCINIOIDES, *Wall.*; LEUCOXYLUM BUXIFOLIUM, *Bl.*

References.—*Balfour, Cyclop., 954; Bombay Gasetteer (Kánara), XV., I., 437; Beddome, Ic. Pl., pl. 133.*

Habitat.—"A large tree" (*Flora Br. Ind.*); "an immense evergreen tree, very common in North Kánara" (*Talbot*). Beddome and several other writers allude to this box-wood-like-leaved species as met with in Mysore, the Anamallay hills, and as being distributed to Malacca, Java, and Borneo. Beddome says it is "very common in South Kánara forests of the Gháts and plains." It flowers in the cold season.

624

D. mollis, *Griff.; in Jour. Agri.-Hort. Soc., III., 145; Kurz, For. Fl. Burm., II., 130.*

This plant is not alluded to in the *Flora of British India*, unless it be D. martabanica, *Clarke*, under which is given as a synonym Gunisanthus mollis, *Kurz*. Turning to Kurz's paper in the *Journal of the Asiatic Society of Bengal*, where he first described the plant, he is found to state that D. mollis, *Kurz MS.*, is a synonym for Gunisanthus mollis, *Kurz*; but in his later publication (*For. Fl. Burma, II., 126*), he gives G. mollis, *Kurz*, as a distinct plant from D. mollis, *Griff.* Under the last mentioned name he says—"The berries produce the so-called black dye of the Shans." *Mason mentions the same fact, and states that the tree grows on the mountains which separate the province of Tavoy from the Siamese territory.* He calls it the *ma-kleu*. *This same economic fact has been subsequently reproduced by various writers, none of whom have apparently identified the plant.* Thus Colquhoun (*Among the Shans*) *mentions this plant as yielding a black dye.* Balfour, Liotard, *and others describe it as the "celebrated vegetable black dye."*

BLACK DYE. 625

It would be interesting to have this matter cleared up by original investigation. Are there, for example, two trees, *viz.*, Gunisanthus mollis, *Kurz*, and Diospyros mollis, *Griff.* (*as in Kurz, For. Fl.*); if not, are both these synonyms for D. martabanica, *Clarke* (*as in the Flora of British India*)? The dye obtained is so highly spoken of, that this subject would seem to call for early investigation. Black dyes are reported to be obtained from the shoe-flower (Hibiscus rosa-sinensis), from the juice of the cashew tree (Anacardium occidentale), from the fruit of various species of Melastoma (hence the name, because of the fruits staining the mouth black), and from this imperfectly known Diospyros—the Shan black-dye. In his report on Pegu Kurz says the wood of Gunisanthus mollis is of a red brown colour, rather heavy, has a short fibre, is close-grained and soft. It is soon attacked by xylophages.

Other Black Dyes. 626

TIMBER. 627

628

D. montana, *Roxb.; Fl. Br. Ind., III., 555; Wight, Ic., t. 1225.*

Syn.—D. CORDIFOLIA, *Roxb.*; D. RUGOSULA, *Br.*; D. BRACTEATA, *Roxb.*; D. HETEROPHYLLA, *Wall.*; D. SYLVATICA, *Wall., not of Roxb.*; D. PUNCTATA, *Dcne.*; D. GOINDU, *Dalz.*; D. WALDEMARII, *Klotzsch.*

Vern —*Tendu, dasaundu, lohari, bistènd*, HIND., *Ban-gab* (e g, wild

Tl

cularly with the Telegu people.
References —

Habitat —A tree often spinose, met with "from the Himálaya (on the Raví eastward, *Brandis*) to Ceylon and Tenasserim common" "D cordifolia has the female peduncles ¼ to ¾ in, the leaves and calyx sub-persistently pubescent · D. montana has them glabrescent. Beddome maintains these as distinct species" (*Fl. Br. Ind*). Roxburgh dis- ... oth, ... ha: ... 12 ... iled above under one species are by the natives distributed under two, and it

MEDICINE Fruit. 629

FOOD. 630

Col. J. G. McRae) published in the *Bombay Gazetteer* (*XXV., p. 389*), it is

stated that "The fruit is eaten and much relished by the forest tribes, but is seldom offered for sale in the market;" "except in the size of its fruit, which is as large as an apple, it is scarcely distinguishable from **D. melanoxylon**, *tamrug*, whose fruit is of the size of a plum." On the other hand, Mr. J. C. Lisboa (*Useful Plants of Bombay, page 93*) describes **D. montana**, *Roxb.* (giving "**D. Goindu**, *Dalz.*" as a synonym), and states that the "fruit is bitter, not eaten." At page 164 he gives an account of "**D. Goindu**, *Dalz.*" (placing **D. montana**, *Roxb.*, under *it* as a synonym), and remarks that "The fruit globose, size of large cherry, yellow when ripe, is said by Dr. Birdwood to be eaten as a fruit." In the *Ahmednagar Gazetteer* it is stated that the *Gondhan* (**D. cordifolia**) bears an edible fruit. Of the Panjáb, Stewart writes: "The fruit is not eaten, and I have heard it called 'poisonous.'" This confusion may perhaps be accounted for by the amalgamation of **D. montana** and **D. cordifolia** into one species.

FODDER. 631

Fodder.—"Leaves used as fodder in Oudh" (*Brandis*).

TIMBER. 632

Structure of the Wood.—Yellowish-gray, soft, no heartwood, no annual rings. It is durable and would be good for furniture.

"The wood is used for making carts (*Panch Mahál Gaz.*, 201). Dr. Hove (a Polish botanist who visited Gujarat in 1787) describes a forest of "black-wood" and the process adopted for darkening the timber. Modern writers are disposed to regard the "black-wood" described by Hove as having been **D. montana** and not **Dalbergia latifolia**. Hove states that the wood was buried in a swamp, and after soaking till it was black was sent for sale to Surat and other places on the coast (*Conf.* with **Dalbergia latifolia**, p. 9). "A small tree of the ebony kind with black and variegated streaks towards the heart. The wood is pretty strong but is not much used" (*Kánara Gaz.*, 67). "Wood is dark-brown, mottled with white, hard, close-grained, takes a fine polish, and is used for furniture" (*Lisboa*). In Koláha it is said to be used in hut and cowshed building. "It has a very hard strong wood, but, except for cart poles, is not much used. The fact that it is not durable, that it suffers from the attacks of insects and cannot be crested, takes away from the value of its timber. The centre or heartwood, which is very small, is ebony of an inferior kind; but except that it is turned into wooden bracelets, it is apparently not known in trade" (*Bombay Gaz.*, XXV., 389). In Ahmednagar it is said that the wood of this species is good fuel, and that it is used chiefly for making field and other tools. Balfour affirms that the tree is not uncommon along the Siwalik tract up to near the Ravi, and occasionally out in the plains westward from near Delhi to Sirsa. The wood, dark and strong, is fitted for agricultural implements, in door work, &c.; does not bear exposure, and could not be creosoted.

633

Diospyros nigricans, *Wall.*; *Fl. Br. Ind.*, *III.*, 557.

References.—[*Beddome, For. Man.*, 144, so quoted in *Fl. Br. Ind.*, seems to the writer to be the description of the plate 124, *Ic. Pl. Ind. Or.* (D. NIGRICANS, *Dalz.*), that description being simply reprinted in the *Icones*. Beddome probably never saw D. NIGRICANS, *Wall.*, a Khásia Hill plant, so that his plate and description appear to refer to the Konkan species, D. ASSIMILIS, *Bedd.*]

Habitat.—A tree attaining a height of 50 feet, met with in the Khásia Hills and Sylhet.

TIMBER. 634

Structure of the Wood.—Nothing is known as to the special properties of the timber of this tree. It doubtless possesses the characteristic features of the other species, but it is alluded to in this place chiefly with the view of correcting a mistake current in Indian botanical works, and

which took its origin with the late Mr Dalzell *viz*, of mistaking Beddome s D assimilis for D nigricans, *Wall* (*Conf* with D assimilis, *Bedd*)

Diospyros oleifolia, *Wall*, *Fl Br Ind*, *III*, *567* — 635

Habitat —A large tree, attaining a height of 60 feet, met with in Amherst, Pegu Martaban and Tenasserim, frequent

Structure of the Wood —Sapwood white or yellowish white, heavy, fibrous, close-grained, soft (*Kurz*) — TIMBER 636

D. oocarpa, *Thw*, *Enum*, *180*, *Fl Br Ind*, *III*, *560* — 637

Vern —*Vellai karun kali* (TAM in Ceylon), *Kalu kadumberiya* SING

References —*Gamble, Man Timb 250, Thwaites, En Ceylon Pl 180 Trimen, Sys Cat Ceylon Pl, 52, Indian Forester, X, 31, Balfour, Cyclop, 954*

Habitat —A middle-sized tree of the Konkan Mysore, and Ceylon

Structure of the Wood —Purplish-brown, with black streaks, moderately hard, a handsome wood Often spoken of as one of the Calamander woods — TIMBER 638

D. ovalifolia, *Wight*, *Ic*, *t 1227*, *Fl Br Ind III*, *557* — 639

Vern —*Vedu kunari* (TAM in Ceylon), SING

References —*Beddome For Man, 143 Thwaites En Ceylon Pl, 181 Trimen, Sys Cat Ceylon Pl, 52 Indian Forester, III, 203, VIII, 29 X, 31, Balfour, Cyclop, 954*

Habitat —A middle sized tree met with in the South Deccan Peninsula, Coimbatore and Nilgiri Hills, Anamallay and Tinnevelly Hills

D. paniculata, *Dalz*, *in Hook Kew Journ*, *IV*, *109*, *Fl Br Ind*, [*III 570* — 640

References —*Bedd Ic Pl Ind Or, t 125 and For Man 144 Dalz and Gibs, Bomb Fl, 141 Lisboa, U Pl Bomb, 94 Kanara Gazetteer 437, Balfour Cyclop, 954*

Habitat —A large tree of the Deccan and Konkan Mr Lisboa mentions the Chorla Ghats and Raighát and Mr Talbot the Sahyadris near Mavimone Beddome quotes the Carcoor Ghát (Wynaad) at elevations of 2,000 to 3 000 feet

It flowers during the cold season

D. pruriens, *Dalz*, *in Hook Kew Journ*, *IV*, *110*, *Fl Br Ind* [*III*, *553* — 641

References —*Bedd, Ic Pl Ind Or, t 129 and For Man, 144 Dalz and Gibs, Bomb Fl, 141 Lisboa U Pl Bomb, 95 Balfour, Cyclop, 954 Bombay Gazetteers (Kanara) XV, Pt I, 437, XXV, 348*

Habitat —A sı
from Bombay an
altitude 1,000 to
Nilkund Ghats

D. pyrrhocarpa, *Miq*, *Fl Br Ind*, *III*, *571* — 642

Vern —*Tay, té*, BURM

References —*Kurz, For Fl Burm, II, 136, Gamble, Man Timb, 252*

Habitat —An evergreen tree of the Andaman Islands The *Flora of British India* alludes to this as a doubtfully Indian spec es but both Gamble and Kurz mention it as met with occas onally in the Andaman Islands

DYE. 643

Dye.—**Major Ford** says the Burmese extract a red dye from the fruit, and that the Chinese umbrellas are dyed with that substance, which has the property of rendering them waterproof.

FOOD. Fruit. 644

Food.—The FRUIT is said to be eaten by the Burmese.

TIMBER. 645

Structure of the Wood.—Reddish-brown, moderately hard to hard; weight 52lb per cubic foot.

646

Diospyros quæsita, *Thwaites; Fl. Br. Ind., III., 560.*

THE CALAMANDER WOOD.

Vern.—*Pú-karunkáli* (TAM. in Ceylon); *Kalumediriya*, SING.

References.—*Bedd., Ic. Pl., pl. 128; Brandis, For. Fl., 296; Thwaites, En. Ceylon Pl., 179; Tennet, Nat. Hist. Ceylon, 118; Trimen, Sys. Cat. Ceylon Pl., 52; Yule-Burnell, Gloss. Anglo-Ind. Terms, 110; Balfour, Cyclop. Ind., 954; Treasury of Botany, 411; Indian Forester, VII., 128; VIII., 29; Gamble, Man. Timb., 250.*

Habitat.—A large tree of Ceylon, alluded to in this place because of the high esteem in which the wood is held. It is at most only experimentally cultivated in India.

TIMBER. 647

Structure of the Wood.—Hard, consisting of irregular alternate layers of black ebony and greyish-brown wood. The most valuable ornamental wood in Ceylon; it is now scarce, and is much in demand. But **D. Kurzii** is often spoken of as a good substitute of this wood (which see).

648

D. ramiflora, *Roxb.; Fl. Br. Ind., III., 569; Wight., Ic., t. 189.*

Vern.—*Uri-gáb* or *gúlul*, BENG.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 414; Voigt., Hort. Sub. Cal., 344; Kurz, For. Fl. Burm., II., 132.*

Habitat. A large tree, native of East Bengal, Tipperah, the Khásia hills, &c. **Kurz** says it occurs in the tropical forests of Arakan and Chittagong.

FOOD. Fruit. 649

Food.—**Roxburgh** remarks that the FRUIT is as large as an orange, takes twelve months to ripen, and is "replete with yellowish edible pulp."

TIMBER. 650

Structure of the Wood.—**Roxburgh** says that in the eastern frontier of Bengal this tree grows to a great size and "supplies the natives with very strong hard wood."

651

D. Sapota, *Roxb.; D.C. Prod., VIII., 228.*

Roxburgh, **Voigt**, and others allude to this species as met with in gardens in India. **Roxburgh** specially mentions that it grows most luxuriantly in the Botanic Gardens and blossoms in the hot season, but has not yet perfected its fruit in Bengal. It is a native of Mauritius and the Philippine Islands. **Hyder Ali** is said to have introduced the tree into his gardens in 1804. The *Mysore and Coorg Gazetteer* calls it the Date Plum, and describes it as a handsome evergreen tree.

652

D. sapotioides, *Kurz; Fl. Br. Ind., III., 562.*

Habitat.—A tree attaining a height of 50 feet; frequent in the Pegu Yomah, Burma.

653

D. stricta, *Roxb.; Fl. Br. Ind., III., 563.* [345.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 415; Voigt., Hort. Sub. Cal.,*

Habitat.—A tall, slender, conical tree, with straight trunk; met with in Eastern Bengal, Sylhet, and Tipperah, &c. **Kurz** adds that it also occurs in Chittagong.

TIMBER. 654

Structure of the Wood.—Of superior quality: its straight stems are taken advantage of in house-building.

655

Diospyros sylvatica, *Roxb*, *Fl Br Ind*, *III*, *559*

Vern.—*Tella goda*, TEL, *Kaluchia*, URIYA

Referen

178,
Cat
Andh

Habitat —A medium-sized tree of the Deccan Peninsula from Bombay and the Circars to Ceylon, ascends to 3,000 feet in altitude

656

D. tomentosa, *Roxb*, *Fl Br Ind*, *III*, *564*; *Wight*, *Ic*, *tt 182*, *183*, not of *Poir*, D. exsculpta, *Ham*, and of *A DC*, *Prodr VIII*, *223*, not of *Dalz* nor of *Bedd.*

Vern —*Tumal, mitha tendu*, HIND, *Kyou, kend*, BENG, *Tiril*, KOL, *Kendhu*, URIYA, *kinnu kendu, tindu*, PB, *Chilta tumiki*, TEL, *Kau lay* (according to Balfour), KAN, *Kakinduka*, SANS., Panjáb bazar name for the medicinal raspings, *bura de abnús*

References —*Roxb*, *Fl Ind*, *Ed C B C*, *413*, *Voigt*, *Hort Sub Cal*, *343 Brandis, For Fl*, *295*, *Stewart, Pb Pl*, *137*; *Elliot, Fl Andh*, *44 Indian Forester, X*, *543*, *XII*, *App 16 Baden Powell, Pb Pr*, *578 Royle, Ill Him Bot*, *262*, *Jour Agri Hort Soc (1867), p 80 Balfour, Cyclop*, *953, 954*

MEDICINE. Raspings 657

FOOD Berries. 658

Food —When ripe the BERRIES are yellowish, and are filled with a soft yellow, sweetish, astringent pulp, eaten by the natives (*Conf* with *D*

Fruit. 659

bitter, fœtid, and emetic

Ploughs. 663

tract, where the tree is more common or better looked to, handsome work- ... made from it in the

hard, but somewhat
for the wood-work of their houses.

DYE. 643

Dye.—Major Ford says the Burmese extract a red dye from the fruit, and that the Chinese umbrellas are dyed with that substance, which has the property of rendering them waterproof.

FOOD. Fruit. 644

Food.—The FRUIT is said to be eaten by the Burmese.

TIMBER. 645

Structure of the Wood.—Reddish-brown, moderately hard to hard; weight 52lb per cubic foot.

646

Diospyros quæsita, *Thwaites; Fl. Br. Ind., III., 560.*

THE CALAMANDER WOOD.

Vern.—*Pú-karunkáli* (TAM. in Ceylon); *Kalumediriya*, SING.

References.—*Bedd., Ic. Pl., pl. 128; Brandis, For. Fl., 296; Thwaites, En. Ceylon Pl., 179; Tennet, Nat. Hist. Ceylon, 118; Trimen, Sys. Cat. Ceylon Pl., 52; Yule-Burnell, Gloss. Anglo-Ind. Terms, 110; Balfour, Cyclop. Ind., 954; Treasury of Botany, 411; Indian Forester, VII., 128; VIII., 29; Gamble, Man. Timb., 250.*

Habitat.—A large tree of Ceylon, alluded to in this place because of the high esteem in which the wood is held. It is at most only experimentally cultivated in India.

TIMBER. 647

Structure of the Wood.—Hard, consisting of irregular alternate layers of black ebony and greyish-brown wood. The most valuable ornamental wood in Ceylon; it is now scarce, and is much in demand. But D. Kurzii is often spoken of as a good substitute of this wood (which see).

648

D. ramiflora, *Roxb.; Fl. Br. Ind., III., 569; Wight., Ic., t. 189.*

Vern.—*Uri-gáb* or *gúlul*, BENG.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 414; Voigt., Hort. Sub. Cal., 344; Kurz, For. Fl. Burm., II., 132.*

Habitat.—A large tree, native of East Bengal, Tipperah, the Khásia hills, &c. Kurz says it occurs in the tropical forests of Arakan and Chittagong.

FOOD. Fruit. 649

Food.—Roxburgh remarks that the FRUIT is as large as an orange, takes twelve months to ripen, and is "replete with yellowish edible pulp."

TIMBER. 650

Structure of the Wood.—Roxburgh says that in the eastern frontier of Bengal this tree grows to a great size and "supplies the natives with very strong hard wood."

651

D. Sapota, *Roxb.; D.C. Prod., VIII., 228.*

Roxburgh, Voigt, and others allude to this species as met with in gardens in India. Roxburgh specially mentions that it grows most luxuriantly in the Botanic Gardens and blossoms in the hot season, but has not yet perfected its fruit in Bengal. It is a native of Mauritius and the Philippine Islands. Hyder Ali is said to have introduced the tree into his gardens in 1804. The *Mysore and Coorg Gazetteer* calls it the Date Plum, and describes it as a handsome evergreen tree.

652

D. sapotioides, *Kurz; Fl. Br. Ind., III., 562.*

Habitat.—A tree attaining a height of 50 feet; frequent in the Pegu Yomah, Burma.

653

D. stricta, *Roxb.; Fl. Br. Ind., III., 563.* [345.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 415; Voigt., Hort. Sub. Cal.,*

Habitat.—A tall, slender, conical tree, with straight trunk; met with in Eastern Bengal, Sylhet, and Tipperah, &c. Kurz adds that it also occurs in Chittagong.

TIMBER. 654

Structure of the Wood.—Of superior quality: its straight stems are taken advantage of in house-building.

655

Diospyros sylvatica, *Roxb.; Fl. Br. Ind., III., 559*

Vern —*Tella goda,* TEL., *Kaluchia,* URIYA.

Re ... *Ceylon Pl., ... men, Sys ... Elliot, Fl*

Habitat —A medium-sized tree of the Deccan Peninsula from Bombay and the Circars to Ceylon, ascends to 3,000 feet in altitude.

656

D. tomentosa, *Roxb; Fl. Br. Ind., III, 564; Wight, Ic, tt 182, 183,* not of *Poir;* D. exsculpta, *Ham,* and of *A. DC., Prodr VIII., 223,* not of *Dalz.* nor of *Bedd.*

Vern.—*Tumal, mitha tendu,* HIND; *Kyou, kend,* BENG, *Tiril,* KOL, *Kendhu,* URIYA, *Kinnú, kendu, tindu,* PB; *Chilta tumiki,* TEL, *Kaulay* (according to Balfour), KAN; *Kakinduka,* SANS.; Panjáb bazar name for the medicinal raspings, *bura de abnus*

References —*Roxb, Fl Ind, Ed C B.C, 413; Voigt, Hort. Sub Cal, 343; Brandis, For Fl, 295; Stewart, Pb Pl., 137; Elliot, Fl Andh, 44; Indian Forester, X, 543; XII, App 16; Baden Powell, Pb Pr, 578, Royle, Ill Him Bot, 262, Jour. Agri-Hort. Soc. (1867), p. 80, Balfour, Cyclop, 953, 954*

This would appear to be the eastern and northern representative of D ...

Medicine —RASPINGS of the wood are officinal in the Panjáb, being given as an alterative (*Stewart*)

MEDICINE. Raspings 657

Food —When ripe the BERRIES are yellowish, and are filled with a soft yellow, sweetish, astringent pulp, eaten by the natives. (*Conf.* with D melanoxylon) Stewart, who in all probability is correctly alluding to this species, since D melanoxylon does not occur in the Panjáb, says the FRUIT, which is reported to ripen in June with the mango, is eaten, being sweetish and astringent and not unpleasant. But one authority reports its pulp as bitter, fœtid, and emetic

FOOD Berries. 658 Fruit. 659

Structure of the Wood —Roxburgh ...
and is in short the ebony of Bengal. ...
this plant is scarce, but that the wood ...
brittle It carves well, and insects ar...
Madhopur workshops, informs me it ...
though hardly so strong as Olea. Ir...
tract, where the tree is more common ...
boxes, &c, are constructed of the wo...
Ambala District In Kangra ...
and for small boxes" ...
white, but that of ol...
hard, but somewhat ...
for the wood-work of their houses.

664

Diospyros Toposia, *Ham.; Fl. Br. Ind., III., 556.*

Syn.—D. RACEMOSA, *Roxb., Fl. Ind., Ed. C.B.C., 414; Wight, Ic., t. 416;* D. LANCEOLATA, *Wall, Cat., 4122;* EMBRYOPTERIS LANCEOLATA, *Don.* According to Brandis, Gamble, and other writers, this is reduced to D. MELANOXYLON, along with D. TOMENTOSA, but by the *Flora of British India* all three are retained as separate species.

Vern.—*Gúlul,* SYLHET; *Kaha-kála,* SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 414; Voigt, Hort. Sub. Cal., 345; Kurz, For. Fl. Burm., II., 128; Beddome, Ic. Pl. Ind. Or., t. 122 & For. Man., 144; Thwaites, En. Ceylon Pl., 179; Trimen, Sys. Cat. Ceylon Pl., 52; Indian Forester, X., 34; Royle, Ill. Him. Bot., 262; Balfour, Cyclop., 954.*

Habitat.—A large tree met with in Sylhet, Cachar, and Chittagong. Roxburgh gives this the same vernacular names as recorded under his D. ramiflora and D. lanceæfolia, and as these trees are all found in the same region, it is probable the natives do not distinguish the one from the other.

FOOD. Fruit. 665

Food.—FRUIT ripens in November and is eaten by the natives (*Roxburgh*).

666

D. Tupru, *Buch.-Ham.; Fl. Br. Ind., III., 563.*

Syn.—DIOSPYROS RUBIGINOSA, *Roth.;* D. MELANOXYLON, *Hiern.,* in part.

References.—*Brandis For. Fl., 295; Bedd., Fl. Sylv., t. 66; Dalz. & Gibs., Bomb. Fl., 142; Bombay Gazetteer (Kanara), XV., Pt. I., 437.*

Habitat.—A small tree of the Western Deccan Peninsula from the Concan to Mysore.

667

D. undulata, *Wall.; Fl. Br. Ind., III., 568.*

Habitat.—A large tree of Amherst, Mergui, and Malacca, mistaken by some writers for D. lucida, *Wall.,* a Singapore and Malacca species. According to Kurz, D. undulata occurs in the tropical forests of Martaban, Tenasserim, and the Andaman Islands. It flowers in April and May, and the fruit ripens in October to February.

668

D. variegata, *Kurz; Fl. Br. Ind., III., 557.*

Habitat.—A large tree (attaining a height of 70 feet) found fairly abundantly in Assam, Pegu, and Martaban, ascending to altitudes of 1,000 feet.

TIMBER. 669

Structure of the Wood.—Sapwood white, turning greyish, heavy fibrous but close-grained, soft (*Kurz*).

DIPLOSPORA, *DC.; Gen. Pl., II., 97.*

670

Diplospora apiocarpa, *Dalz.; Fl. Br. Ind., III., 123;* RUBIACEÆ.

Vern.—*Panigara,* MAR.; *Bachange,* KAN.

References.—*Beddome, Fl. Sylv., t. 223; Ic. Pl. Ind. Or., t. 40; Dalz. & Gibs., Bomb. Fl., 120; Bomb. Gaz., XV., Pt. I., p. 68.*

Habitat.—A small tree of the Western Peninsula from the Concan southwards ascending to 5,000 feet.

TIMBER. 671

Structure of the Wood.—Used to make combs and toys (*Bomb. Gaz., XV., I., 68*).

672

D. singularis, *Korth.; Fl. Br. Ind., III., 123.*

Vern.—*Thittú,* BURM.

Habitat.—A small tree distributed from the Khásia hills to Pegu, Tenasserim, Amherst, Sumatra, Borneo, &c.

Structure of the Wood —Rough with numerous prominent medullary rays weight 36lb a cubic foot (*Kurz, Fl. Brit Burm, II, 50, Gamble, Man Timb, 119*)

TIMBER. 673

DIPLOTAXIS, *DC, Gen Pl, I, 84, 967.*

Diplotaxis Griffithii, *H f & T., Fl Br Ind, I, 157,* CRUCIFERÆ

674

Vern —*Sisgat, mole,* TRANS INDUS *Barani muli, bibûcha, chinaka,* (Sind Sagar Doab), PB, *Parjan?* MERWARA

be given from Merwara

Food —Eaten as a pot-herb

FOOD 675

DIPTEROCARPUS, *Gærtn. f, Gen Pl, I, 191, 981*

A
Asia
of whi
Burm
in allu

Dipterocarpus alatus, *Roxb; Fl Br Ind, I, 298;* DIPTEROCARPEÆ

676

Syn —DIPTEROCARPUS COSTATUS, *Gærtn f*

Vern —*Garjan (batti-sal* according to Balfour, *shweta garjan,* according to Birdwood) BENG, *Kanyinbyu* (=white *Kanyin*), BURM, *Horagaha* (according to Birdwood), SING

References —

Habitat —A large tree met with in Chittagong, Burma, and the Andaman Islands, distributed to Siam

Oleo-resin —Kurz says this tree yields a WOOD-OIL in great quantity and exudes a dirty-brown resin The oil and resinous thicker substance are at first mixed together; this mixture is strained through a cloth whereby

OLEO-RESIN. Wood-oil 677

in India, the name of Garjan oil, but this point has not been satisfactorily determined, and it seems likely that the Garjan oil of European and Indian commerce may in reality be any one or a mixture of all the *Kanyin* and *in* oils but chiefly of the former For particulars as to the extraction of *Kanyin*-oil see a further page under D turbinatus

TIMBER. 678

Structure of the Wood.—Sapwood white; heartwood reddish-grey, moderately hard, smooth, mottled, takes a fine polish. Weight from 38 to 50lb a cubic foot. Used for house-building and canoes, but is not durable; if exposed to wet it decays rapidly, the canoes made of it lasting only three to four years.

679

Dipterocarpus angustifolius, *W. & A.; Fl. Br. Ind., I., 299.*

Syn.—DIPTEROCARPUS COSTATUS, *Roxb.* (*not of Gærtn. f.*).

According to **Roxburgh** this species is a native of Chittagong. By the *Flora of British India* it is viewed as doubtfully distinct.

680

D. Griffithii, *Miq.; Fl. Br. Ind., I., 299.*

Syn.—DIPTEROCARPUS GRANDIFLORUS, *Griff.* (*not of Wall*).

References.—*Kurz, For. Fl. Burm., I., 116; Report on Gums and Resins issued by P. W. D., pp. 34, 62, 64.*

Habitat.—A tree of the Mergui and South Andaman Islands. **Kurz** says it is common in the tropical and moister upper mixed forests of the Andamans and also in Tenasserim.

TIMBER. 681

Structure of the Wood.—Yellowish-grey, rather coarsely fibrous, close-grained, and heavy (*Kurz*).

682

D. incanus, *Roxb.; Fl. Br. Ind., I., 298.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 439; O'Shaughnessy, Beng. Dispens., 224; Dymock, Mat. Med. W. Ind., 2nd Ed., 88; Report on Gums and Resins issued by the P. W. D., pp. 19, 20, 31, 35, 37; Cooke, Gums and Gum-resins, 114; Agri-Hort. Soc. of India Journ., Vol. IV., 15; Spons' Encyclop., 1651; Balfour, Cyclop., 956, 1087.*

Habitat.—A tree of Chittagong (*Roxburgh*), but according to **Kurz** it occurs also in Pegu.

OLEO-RESIN, Wood-oil. 683

Oleo-resin.—It yields a WOOD-OIL or balsam. **Roxburgh** says this is the *garjun* tree of Chittagong "where the tree grows to a great size and is said to furnish the largest proportion of the best sort of wood-oil or balsam mentioned in my description of **D. turbinatus.** Flowering time November and December, and the seed ripens in April." **Balfour** seems to be mistaken when, after enumerating **Dipterocarpus alatus, D. costatus, D. incanus, D. lævis,** and **D. turbinatus** as yielding wood-oil, he adds "but **D. incanus** is supposed to yield the best sort and in the greatest quantity."

MEDICINE. Oil. 684

Medicine.—**Dymock** also includes this plant along with **D. turbinatus** and **D. alatus** in his account of the medicinal Gurjun-oil, but it is certainly far less important commercially than Kanyin-oil-yielding trees of Burma.

D. indicus, *Beddome*; see under **D. lævis,** *Ham.*

685

D. lævis, *Ham.; Indian Forester, X., iii., 131; IX., 216.*

The lofty tree so named—a native of the tropical forests of Burma—is, by the *Flora of British India*, reduced to be a synonym for **D. turbinatus,** *Gærtn. f.* It has been the custom followed by the writer to accept the *Flora* as the standard on all botanical points, the endeavour being made in the present work to compile the economic information regarding plants under the names as established by **Sir J. D. Hooker.** **Gamble, Kurz,** and other Indian botanists do not, however, accept the above reduction as correct, but prefer to regard these names as belonging to distinct trees. Should this latter opinion be confirmed, the information given under **D. turbinatus** would probably, to some extent, have to be rearranged. **Gamble,** however, affirms that the Garjan-oil tree is **D. turbinatus,** although under

D. lævis he makes the remark that "it yields copiously a resin and a wood-oil used for pai
garjan and wood-oil
trees If this be so,
what has been given
mention in this place the Burmese name given to D lævis, *Ham*, *viz*, *Kanyin ni* (*e g*, red *Kanyin*), while D alatus is known as *Kanyin-byu* (*e g*, white *Kanyin*) Gamble points out that, according to the *Flora of British India*, D indicus, *Beddome*, *t 94*, may be reduced either to D turbinatus or D. lævis He appears, however, to view it as a distinct species, a native of the western Ghats, which is there known as *Guga* and *Walivara* in Kánarese The Garjan oil reported to be made in South India would, accordingly, be the produce of D indicus

Resin —The authors who recognise this as a distinct species say that it yields a RESIN similar to that of all the other species — REISN. 686

Oil —For information as to the wood oil obtained from this plant, see under D turbinatus — OIL. 687

Structure of the Wood —Sapwood white, heartwood rough, reddish, soft, is rarely used, but is occasionally employed for planking and rafters, weight 43—49lb a cubic foot. — TIMBER 688

Dipterocarpus obtusifolius, *Teysm*, *Fl Br Ind*, *I*, *295* — 689

This is in Burma called the male *In* tree or *Inbo*

Vern.—*Inbo, kanyin kok* (according to Gamble), BURM.

References —*Kurz For Fl Burm*, *I*, *115*, *Gamble, Man Timb*, *31* *Indian Forester*, *VIII*, *416*

Habitat —A large, deciduous tree of the Eng (*In*) forests of Prome and Martaban, ascending to 3,000 feet. It is commonly found forming

RESIN 690

TIMBER. 691

(*Gamble*) Kurz says it is of the quality of that of *Eng*'

D. pilosus, *Roxb*; *Fl Br Ind*, *I*, *296* — 692

Vern —*Hollong*, ASSAM

References —*Roxb*, *Fl Ind Ed*, *C B C*, *440*, *Kurz, Fl Burm*, *115*, *Jour As Soc Bengal*, *1870 II*, *65*, *also 1874*, *p 98*, *Forest Fl Burm*, *I 115 Gamble, Man Timb*, *31*

Habitat —A large evergreen tree met with in Assam, Chittagong, Pegu, Arracan, hills of Martaban and Tenasserim, and also the Andaman Islands Distributed to Sumatra

Oleo-resin —Mr Oliver, in the report below and accompanying correspondence, suggests that perhaps some of the Kanyin oil of Tenasserim may be obtained from this tree — OLEO-RESIN 693

Structure of the Wood —"Of a reddish-brown colour, close and pretty straight grain, it does not warp or split much but quickly deteriorates unless kept
timber inse
except for
be borne in
business, as not less than 400,000 boxes for packing tea are used yearly, the making of each one requiring about 1 50 cubic feet of rough timber' (*Pogmini, in Indian Forester*) — TIMBER 694; Packing boxes. 695

TIMBER. 678

Structure of the Wood.—Sapwood white; heartwood reddish-grey, moderately hard, smooth, mottled, takes a fine polish. Weight from 38 to 50lb a cubic foot. Used for house-building and canoes, but is not durable; if exposed to wet it decays rapidly, the canoes made of it lasting only three to four years.

679

Dipterocarpus angustifolius, *W. & A.; Fl. Br. Ind., I., 299.*

Syn.—Dipterocarpus costatus, *Roxb.* (*not of Gærtn. f.*).

According to Roxburgh this species is a native of Chittagong. By the *Flora of British India* it is viewed as doubtfully distinct.

680

D. Griffithii, *Miq.; Fl. Br. Ind., I., 299.*

Syn.—Dipterocarpus grandiflorus, *Griff.* (*not of Wall*).

References.—*Kurz, For. Fl. Burm., I., 116; Report on Gums and Resins issued by P. W. D., pp. 34, 62, 64.*

Habitat.—A tree of the Mergui and South Andaman Islands. Kurz says it is common in the tropical and moister upper mixed forests of the Andamans and also in Tenasserim.

TIMBER. 681

Structure of the Wood.—Yellowish-grey, rather coarsely fibrous, close-grained, and heavy (*Kurz*).

682

D. incanus, *Roxb.; Fl. Br. Ind., I., 298.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 439; O'Shaughnessy, Beng. Dispens., 224; Dymock, Mat. Med. W. Ind., 2nd Ed., 88; Report on Gums and Resins issued by the P. W. D., pp. 19, 20, 31, 35, 37; Cooke. Gums and Gum-resins, 114; Agri-Hort. Soc. of India Journ., Vol. IV., 15; Spons' Encyclop., 1651; Balfour, Cyclop., 956, 1087.*

Habitat.—A tree of Chittagong (*Roxburgh*), but according to Kurz it occurs also in Pegu.

OLEO-RESIN. Wood-oil. 683

Oleo-resin.—It yields a wood-oil or balsam. Roxburgh says this is the *garjun* tree of Chittagong "where the tree grows to a great size and is said to furnish the largest proportion of the best sort of wood-oil or balsam mentioned in my description of **D. turbinatus.** Flowering time November and December, and the seed ripens in April." Balfour seems to be mistaken when, after enumerating **Dipterocarpus alatus, D. costatus, D. incanus, D. lævis,** and **D. turbinatus** as yielding wood-oil, he adds "but **D. incanus** is supposed to yield the best sort and in the greatest quantity."

MEDICINE. Oil. 684

Medicine.—Dymock also includes this plant along with **D. turbinatus** and **D. alatus** in his account of the medicinal Gurjun-oil, but it is certainly far less important commercially than Kanyin-oil-yielding trees of Burma.

D. indicus, *Beddome*; see under **D. lævis,** *Ham.*

685

D. lævis, *Ham.; Indian Forester, X., iii., 131; IX., 216.*

The lofty tree so named—a native of the tropical forests of Burma—is, by the *Flora of British India,* reduced to be a synonym for **D. turbinatus,** *Gærtn. f.* It has been the custom followed by the writer to accept the *Flora* as the standard on all botanical points, the endeavour being made in the present work to compile the economic information regarding plants under the names as established by Sir J. D. Hooker. Gamble, Kurz, and other Indian botanists do not, however, accept the above reduction as correct, but prefer to regard these names as belonging to distinct trees. Should this latter opinion be confirmed, the information given under **D. turbinatus** would probably, to some extent, have to be rearranged. Gamble, however, affirms that the Garjan-oil tree is **D. turbinatus,** although under

D. lævis he makes the remark that "[illegible]" wood-oil used for painting." According to some [illegible] garjan and wood-oil are distinct [illegible] trees. If this be so, a [illegible] what has been given below. I [illegible] mention in this place the Burmese name given to D. lævis [illegible] *Kanyin ni* (e g., red *Kanyin*), while D. [illegible] (e g., white *Kanyin*). Gamble [illegible] *British India*, D. indicus, [illegible] turbinatus or D. lævis. He [illegible] species a native of the western Ghats [illegible] and *Halvara* in Kanarese. The [illegible] India would accordingly be the produce of D. indicus.

Resin.—The authors who [illegible] it yields a RESIN similar to that of all the other [illegible].

Oil.—For information as to the wood-oil [illegible] under D. turbinatus.

Structure of the Wood.—Sapwood white, [illegible] soft, is rarely used, but is occasionally employed [illegible] weight 43—49 lb a cubic foot.

Dipterocarpus obtusifolius, *Teysm., Fl. Br. Ind., I., [illegible]*

This is in Burma called the male *In* tree [illegible].

Vern.—*Inbo, kanyin-kos* (according to Gamble) [illegible].

References.—*Kurz, For. Fl. Burm., I., [illegible]; Gamble, Man. Timb., [illegible]; Indian Forester, VIII., [illegible].*

Habitat.—A large, deciduous tree of the [illegible] and Martaban, ascending to 3,000 feet. [illegible] small patches in the *In* forests.

Resin.—This tree is said to afford a [illegible]

Oil.—This is reported to burn [illegible], but is not used for [illegible].

Structure of the Wood.—Heartwood red, [illegible] ly hard. Pores large and [illegible]. Weight [illegible] (*Gamble*). Kurz says it is "of the quality of that of [illegible]."

D. pilosus, *Roxb.; Fl. Br. Ind., I., [illegible]*

Vern.—*Hollong*, ASSAM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., [illegible]; Jour. As. Soc. Beng., [illegible]; [illegible] I., 115; Gamble, Man. Timb., [illegible].*

Habitat.—A large evergreen tree [illegible] Pegu, Arracan, hills of Martaban and Tenasserim [illegible] Islands. Distributed to Sumatra.

Oleo-resin.—Mr. O [illegible] spondence, suggests that [illegible] may be obtained from [illegible].

Structure of the Wood.—[illegible] straight grain, [illegible] unless kept in a dry [illegible] timber insects. [illegible] standing [illegible] except for temporary purposes [illegible] be borne in mind [illegible] business, [illegible] the making of [illegible] (*Paganini, in Indian Forester,* [illegible])

The Garjan or Kanyin Oil.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 439; Kurz, For. Fl. Burm., I., 114, 115; Gamble, Man. Timb., 31, 32; Mason's Burm. & Its People, pp. 493, 516, 527, 757; Hooker, Him. Jour., II., 348; Report & Gazetteer of Burma by Major Douglas Macneill (prepared for Q. M. G.'s Dept.), Vol. II., 228; O'Shaughnessy, Beng. Dispens., 12, 222; Dymock, Mat. Med. W. Ind., 2nd Ed., 88; Flück. & Hanb., Pharmacog., 88; U. S. Dispens., 15th Ed., 1779; Extra Pharm. by Martindale & Westcott, p. 92; Year Book Pharm., 1875, 503; Royle, Prod. Res. of India, 77; Birdwood, Bomb. Pr., 11, 257; Cooke, Gums and Gum-resins, 113; Report on Gums issued by the P. W. D., pp. 19, 41; Spons' Encyclop., 1651: Balfour, Cyclop., 957, 1087; Home Dept. Cor., 225, 230, 232, 290; Trans. Agri.-Hort. Soc., VIII., 345; Jour. Agri.-Hort. Soc., Vol. IV., 14.*

Habitat.—An evergreen tree of Eastern Bengal, Chittagong, Burma, and (according to Gamble) of the Andaman Islands. Distributed to Singapore.

It is said to be one of the loftiest of Indian trees, individual specimens being sometimes seen 250 feet in height, but **D. lævis** is generally reported to be the higher form, **D. turbinatus** rarely exceeding 200 feet. Hooker, referring to **D. turbinatus** in his account of Chittagong, says: "This is the most superb tree we met with in the Indian forests; we saw several species, but this is the only common one here; it is conspicuous for its gigantic size, and for the straightness and graceful form of its tall unbranched pale grey trunk, and small, symmetrical crown: many individuals were upwards of 200 feet high, and 15 in girth."

OLEO-RESIN.

PROCESS OF EXTRACTION 702

Oleo-resin.—Considerable confusion exists in the literature of Garjan and Wood-oil. Apparently several species of **Dipterocarpus** yield balsamic products to which it would seem the name *garjan* oil is assigned. In Burma one set of oils is, however, collectively spoken of as *Kanyin*-oils, another as *In*-oils. The term garjan appears to be unknown to the Burmans.

IN BURMA. 703

A reference having been made by the Revenue and Agricultural Department to the Government of Burma for particulars, to be inserted in the present publication, as to the "various species of **Dipterocarpus** that yield wood-oil (*garjan*)," the following instructive reply was obtained: The passage here quoted is in continuation of that given above under **D. tuberculatus**:—"Kanyin oil is the produce of **D. lævis** (*Kanyin-in* = Red *Kanyin*) and **D. alatus** (*Kanyin-byu*=White *Kanyin*) which are common in evergreen forests, and probably of other species of similar habitat. The oil is generally collected only in the dry weather (November to May). It is obtained by cutting two or three deep pyramidal hollows (the apex pointing towards the interior of the stem) near the foot of the tree and by applying fire to the upper cut surfaces. The oil then collects at the bottom of the hollow, which is emptied every three or four days. Fire is applied every time the oil is removed, and the upper surfaces of the hollow are rechipped three or four times during the season. In Tharrawaddy district, where trees are not very plentiful, twenty are about as many as one man can attend to. The yield of twenty trees would be about 100 viss for the season, worth R25. In Prome district oil only comes into the market in the form of torches, which are made of rotten wood steeped in oil and rolled up in *Salu* leaves (**Licuala peltata**). The exports of Kanyin oil from Burma ports during 1887-88 were as follows:—

		R
Rangoon	18,826 gallons valued	16,302
Moulmein	782 " "	575
Mergui	55,470 viss "	9,394

PROCESS OF EXTRACTION.

The exports of torches were:—

		R
Tavoy	2,000 valued at	30
Mergui	850,225 " "	22,372

[illegible] the oil from the different kinds of Kanyin trees [illegible]

IN CHITTAGONG. 704

prohibition does not extend to the hill tracts. As much of the oil exported from the hill tracts is shoulder-borne, the total amount exported cannot be definitely stated. But the total amount carried past the revenue stations and which paid a royalty of 10 per cent. *ad valorem* in 1883-84 to 1887-88 may be said to have been as follows: 1883-84, 355 maunds, 1884-85, 125 maunds, 1885-86, 96 maunds, 1886-87, 60 maunds, and 1887-88, 51 maunds.

"The mode of tapping is to cut a deep hollow in the tree, and keep live charcoal in it at night. The oil is removed in the morning, and fresh live charcoal put in again at night. It is repeated till the oil ceases to flow. Three, four, or more such deep hollows are often cut in the same tree, with the not surprising result that the tree is killed. The falling-off in exports is most probably due to most of the trees having been already killed by the tapping." A sketch was furnished along with the above report, in which the notch made in the trees was shewn to be the same as that described in Burma by the above passage. In this way a cavity is formed with a flat bottom on which it would be possible to deposit live charcoal, but it may here be added that in Burma charcoal does not appear to be used.

IN COORG. 705

The other communication was from the Conservator of Forests, Coorg, which gives an account therefore of the wood-oil prepared in that portion of the west coast of Southern India (Conf. with remarks under D. laevis regarding D. indicus). The Conservator writes: "We have two oil trees in the Western Ghat Forests of Coorg. Both I believe are species of Dipterocarpus, but have not been able to get the flowers to identify them. The oil is contained in the pores of the wood, and is collected by cutting a hole into the centre of the tree. One species yields a yellow oil and the other a dark red. The former is sold in the bazaars mixed with [illegible] (the produce of Vateria indica) as varnish at [illegible]. The latter also makes a fair varnish. It has a strong [illegible], and would probably be useful in medicine."

Tapping. 706

During a conversation on this subject with the writer, Mr. Ribbentrop remarked that it was [illegible] to [illegible] the trees that yield Kanyin and *In* oils. D. tuberculatus, the *In*, was a [illegible] tree, found only on the [illegible] soils, and [illegible] associate the oil (Shorea [illegible]. This was [illegible] sole source of the oil which was collected [illegible] flowing from a wound without the aid of fire. [illegible] were D. turbinatus, D. laevis, and D. alatus. [illegible] in mixed forests, and tower above the surrounding trees. [illegible] deep rich soils and yield [illegible] charred. Mr. Ribbentrop regards D. laevis [illegible] D. [illegible]

tus; the former being a much loftier tree than the latter. Kurz mainly distinguishes these plants by the former being glabrous, while the latter is hairy.

VARIETIES. 707

Varieties of Garjan Oil.—The writer can discover no author who has separately distinguished the oleo-resins described above; indeed, in all the published accounts, which he has been able to consult, the substance described appears to be that obtained after charring the trees—the Kanyin oils. Thus Roxburgh wrote of **D. turbinatus** that "To procure the balsam a large notch is cut into the trunk of the tree, near the earth (say, about thirty inches from the ground), where a fire is kept up until the wound is charred, soon after which the liquid begins to ooze out. A small gutter is cut in the wood to conduct the liquid into a vessel placed to receive it. The average produce of the best trees during the season is said to be sometimes forty gallons. It is found necessary, every three or four weeks, to cut off the old charred surface, and burn it afresh; in large healthy trees abounding in balsam, they even cut a second notch in some other part of the tree, and char it as the first. These operations are performed during the months of November, December, January, and February. Should any of the trees appear sickly the following season, one or two more years' respite is given them." Lieut. Hawkes published, in his report on the Oils shown at the Madras Exhibition of 1855, an account of the extraction of this oil by charring, the operation being performed in "March or April." But Lieut. Hawkes was apparently, like Roxburgh, ignorant of the oil extracted from **D. tuberculatus** with or without the aid of fire. Sir J. D. Hooker (*Him. Journals, Vol. II., 348*) gives a brief note regarding the oleo-resin obtained in Chittagong from **D. turbinatus**. He says: "A fragrant oil exudes from the trunk, which is extremely valuable as pitch and varnish, &c., besides being a good medicine. The natives procure it by cutting transverse holes in the trunk, pointing downwards, and lighting fires in them, which causes the oil to flow." Mason, than whom few more trustworthy authors on Burmese subjects could be found, attributes wood-oil to **D. lævis** and **D. turbinatus**, but says of **D. grandiflora** (a synonym for **D. tuberculatus**) that "the gum of this species, as well as that of the preceding, is used by the natives to make torches." It is, however, significant that Mason should not have described the process of extraction of his "wood-oil" or of the "gum," nor even mentioned the seasons at which these products are obtained. Dr. Cooke, in his report on the Gums, Resins, and Oleo-resins of India, quotes Roxburgh's description of the process of extraction, and reviews the opinions advanced by Lieut. Hawkes under **D. turbinatus**, *Gærtn. f.*; but under **D. tuberculatus**, *Roxb.*, he simply remarks: "A wood-oil, under the name of *Eng*, is said to be the produce of **D. tuberculatus**; this was sent to London from Burma (May 1874) for valuation and report." Flückiger and Hanbury (in their *Pharmacographia*) follow the same course, but seem not to have heard of an oil extracted without the aid of fire, such as the thick oleo-resin known in Burma as *In*-oil.

In a further paragraph will be found the opinions of medical writers regarding Garjan oil, in which it is held that there are different qualities, some of very considerably higher medicinal merit than others. This fact would point to the desirability of a thorough investigation into the oleo-resins obtained from all the species of **Dipterocarpus** in which the chemical properties and industrial merits of each should be separately established. With this in view experiments might be conducted in order to ascertain if **D. tuberculatus** is the only species that affords the oil on being simply tapped, or whether **D. turbinatus** and **D. lævis** might not also do so, and lastly what action or influence the charring process exercises. It

VARIETIES.

seems probable that, assuming that the oleo-resins from all the species of Dipterocarpus are chemically identical, that obtained during a different season of the year, and by a different process may be distinct or have its

CHEMISTRY. 708

this oil is the fact that it is reported to act as a solvent to caoutchouc. This was apparently discovered at the beginning of the present century by Mr. Laidlay, and his experiments will be found in the *Transactions*

This fact appears to have been practically lost sight of, while it might prove the key to an industrial utilisation of the substance, since such water-proofings would, from the property of the *garjan* oil, be at least proof against the attacks of insects, if they were not found in addition to *possess other useful properties.*

A sample of *garjan* oil obtained from Moulmein was examined by

was uncrystallisable. Werner, however, found a sample of *garjan* oil examined by him (as well as its resin) to be entirely soluble in boiling potash lye. The crystallisable acid extracted from the resin Werner called *Gurjanic* ($C_{44}H_{68}O_{8}$): it is soluble in alcohol 0.838 but not in weaker. It is dissolved also by ether, benzol, or sulphide of carbon,

CHEMISTRY.

The amorphous resin, which forms the chief bulk of the substance obtained after the removal of the essential oil, has not as yet been definitely analysed. Flückiger and Hanbury found, however, that after complete desiccation it was not soluble in absolute alcohol. These authors add that a sample of *garjan* balsam of unknown origin yielded a crystallisable substance answering to $C_{28} H_{46} O_2$: and this was devoid of acid character. They would thus appear to have inferred that the *garjan* oil of commerce is not a substance of uniform chemical character, hence they conclude by recommending that "a comparative examination of the product of each of the above named species of Dipterocarpus would be highly desirable." Dr. Dymock, while not materially enriching the chemical knowledge of this substance, gives much interesting information as to the medical opinion held regarding the properties of the drug. The admission of different chemical and medicinal results confirms to a large extent the contention advanced in this work, *viz.*, that there are at least two widely different substances sold in the markets of India under the name of Garjan oil, the Kanyin, and In Oils of Burma.

TRADE. 709

TRADE IN GARJAN OR WOOD-OIL.—The above special reports regarding the *garjan* oil of Burma and Chittagong make the usual admission that, owing to the cheap price of kerosine, the trade in wood-oil has very considerably declined. It is now mainly used for torches and in water-proofing, &c. The trade in the medicinal *garjan* oil must be very limited indeed. It appears to be mainly obtained from the Andaman Islands and to be the produce of D. alatus, and possibly D. turbinatus.

Flückiger and Hanbury (*l. c.*) state that the world's supply is obtained from "Singapore, Moulmein, Akyab, and the Malayan Peninsula, and is a common article of trade in Siam." (*Conf.* with Mr. Oliver's opinion above as to the plant which yields the Tenasserim oil) "It is likewise produced in Canara in South India." (*Conf.* with remarks regarding D. indicus.) "It is occasionally shipped to Europe." The Burma oil is most probably obtained from D. turbinatus and D. alatus (*Kanyin*) and from D. tuberculatus (*In*). Dr. Dymock remarks: "Garjan Balsam is not an article of commerce in Bombay; small quantities may be sometimes obtained in the native drug shops. The Government supplies have been obtained from the Andaman Islands." Dr. Moodeen Sheriff (in his new work on the Materia Medica of South India, of which proofs have been kindly furnished to the author) writes that in Madras "wood-oil is pretty common in most large bazars." He describes several forms and gives their prices:—"Of the black or dark brown variety—wholesale, R12 per maund; retail or bazar, annas 10 per pound. Of the red or reddish-brown variety—wholesale, R24 per maund; retail or bazar, R1-4 per pound. Of the pale white or grey variety—wholesale, R18 per maund; retail or bazar, R1 per pound." He adds: "There are several varieties of *garjan* or wood-oil, but out of these, three are generally met with in the bazars, which are known as *Suféd Garjan-ká-tél* or *Suféd Lakrí-ká-tél* (the pale white or grey variety), *Lál Garjan-ká-tél* or *Lál Lakrí-ká-tél* (the red or reddish-brown variety), and *Kálá Garjan-ká-tél* or *Kálá Lakrí-ká-tél* (the black or dark-brown variety)."

Garjan Balsam. 710

Black Variety. 711

Red variety. 712

Grey variety 713

Fully fifty years ago hopes were entertained that *garjan* oil would become an article of European trade, meeting a demand in the arts. Dr. Royle wrote on this subject, and a member of the Agri-Horticultural Society of India consigned five hundred gallons to London. The effort proved futile, as Dr. Royle reports, because the Custom-house officers refused to pass it except at the highest rate of duty, namely, that for a manufactured article. It seems probable that this obstruction prevented the industrial enterprise of the British manufacturer from being able to discover a use

for an article which has in consequence remained at a nominal value (*Conf.* with p. 164.)

MEDICINE.

MEDICINE. Balsam. 714

Garjan balsam does not appear to have been used medicinally by the early Hindus. It does not bear any Sanskrit, Arabic, or Persian names. In Muhammadan works on Materia Medica it is first mentioned in the *Makhzan* under the name of *Duhn-el-Garjan*. Ainslie was the earliest European medical writer to mention it, and that in his *Materia Medica of Hindústan*—a work published in 1813. A prior notice occurs, however, in a work by Francklin (*Tracts on the Dominions of Ava, p 26*) published in 1811. But Ainslie does not seem to have continued to value the drug, since in his larger and final work—the *Materia Indica*—published in 1826, he makes no mention of it. Sir William O'Shaughnessy in

led to the institution of an extensive set of experiments on the medicinal effects of the former in the treatment of gonorrhœa The results, which have been laid before the profession, and which have been confirmed by

OIL. 715

frequently daily. It generally causes a sensation of warmth at the epigastrium, eructations, and sometimes slight purging. It communicates a strong smell of turpentine to the urine, which it increases remarkably

in that work described as a "
that of the genito-urinary syste
results of various experiments
Dr. T. B. Henderson of Glasg
copaiba failed, and with remar
mery found that it is apt to produce "an eruption of a character similar to that occasionally following the use of copaiba" Dr. Kanny Lall Dey, C.I.E. (*Indigenous Drugs of India, p. 51*) republishes the facts given above regarding the use of the drug in the treatment of gonorrhœa, but adds that "it is also used externally as a stimulating application to indolent ulcers." Waring (*Bazar Medicines, p 56*) says it has the odour

MEDICINE.

than all its varieties in the bazaar, but I did not know the existence of

SPECIAL OPINIONS COMMUNICATED FOR THIS WORK.—§ "Used in
leprosy" (*Surgeon-Major*
effectual in relieving true le
for an ointment take of t
skin diseases and true le
apalle, Cuddapah) "Gurj
leprosy" (*Civil Surgeon*
in leprosy" (*G. A. Wat*
leprosy Externally the c
Internally it is taken in doses of 3 drachms or 1 drachm mixed with

A case of elephantiasis now under observation is being treated with gurjun oil It appears to be useful, though the case is too recent for any

little corrosive sublimate and sulphur is a capital remedy for ringworm" (*Surgeon-Major P N. Mookerji, Cuttack, Orissa*) "I used this oil for two years in the treatment of leprosy, but found it perfectly useless"

gurjun oil as a cure for leprosy in the lepra ward at Burdwan in 1875-76-77 It is useless as a specific, which it was claimed to be, but the ointment is a fairly good application for leprous and other

"The
luable
influ-
ence over all skin diseases, but its curative effect in those of a scaly nature as lepra-vulgaris and psoriasis is highly satisfactory. Many a case of the

MEDICINE.

last-named disease has been relieved by its external use with little or no assistance of internal remedies. I have also employed it pretty extensively in the cure of gonorrhœa, and quite agree with what is already mentioned on this point. There are several varieties of gurjun-balsam, but the thin and reddish brown variety is about the best" (*Honorary Surgeon Mooleen Sheriff Khan Bahadur, Triplicane, Madras*). "Useful application in scabies. It did not prove so useful in my hands in gonorrhœa when administered alone. Combined with liqr. pot. and other medicines in dram doses it has been found to be efficacious in certain cases" (*Assistant Surgeon Shib Chundra Bhuttacharji, Chanda, Central Provinces*). "Recently much praised as a cure for leprosy. I have not been able to obtain any remarkable effects from its use" (*Civil Surgeon G. Price, Shahabad*). "The oil prepared into an ointment for external application, and given internally in leprosy in early stage of the disease, undoubtedly arrests further progress, and affords great relief in advanced cases. The ointment is prepared by mixing the oil with lime water in equal parts, and churning it into a creamy substance. It should be well rubbed into the affected parts, for at least 15 minutes, every morning and evening. The oil given internally from one to ten drops, morning and night, in cold water" (*Civil Surgeon S. M. Shircore, Moorshedabad*). "It is a stimulant diuretic used in gonorrhœa and discharges from the genito-urinary organs, also in leprosy, both internally and externally, with lime water" (*Bolly Chand Sen, Teacher of Medicine*). "*Gurjun* oil was used extensively at the penal settlement of the Andamans in the treatment of leprosy. After long trial it was found to act beneficially in many cases as a palliative remedy, but as a specific for the cure of leprosy it completely failed" (*James Reid, Principal Medical Store-keeper to Government, Fort William*). "Has been used both internally and externally in leprosy with apparent benefit" (*Civil Surgeon J. H. Thornton, B.A., M.B., Monghyr*). "It is a very good application for various kinds of skin diseases" (*Doyal Chunder Shome*).

TIMBER. 717

Structure of the Wood.—Rough, moderately hard; heartwood reddish grey. It is used for house-building and for canoes in Burma. The best Burmese charcoal is made from this and **D. lævis**. (*Gamble*)

Heavy, rather close grained, the sapwood pale brown, narrow, the heart wood darker brown; takes a fine polish (*Kurz*).

Domestic and Industrial Uses of Garjan-oil.

PROPERTIES AND USES.

It is extensively employed by the Burmans as torches, but now-a-days to a limited extent only is it used as a lamp oil. It is largely employed in preserving bamboo wicker-work from the attacks of insects and in paving the bottoms of boats. It is also used as a varnish. It is reported to be useful as an ingredient in lithographic ink. In European medicine it is mainly utilised as an adulterant for Copaiba. But it is commonly held that if a process could be discovered of causing it to dry more rapidly, it would come largely into European use as a varnish. It has been suggested that this might be effected by mixing it with some good drying oil, or by evaporating away the essential oil. It seems to the writer, however, that a far more important way of utilising the article might be found in taking advantage of Mr. Laidlay's discovery that it acts as a solvent to caoutchouc. A thick coating of India-rubber is of course perfectly water-proof, but the way in which India-rubber sheetings, over-coats, &c., harden, dry, and crack at one season of the year or stick together at another under the tropical climate of India, would recommend the experiment being made to ascertain if this would be also the case with a water-proofing

Varnish. 718

Water-proofing. 719

material made of a solution of India-rubber in ... of *Garjan* oil have at all events not received ... *manufacturer*, and Sir William O Shaughnessy's ... quoted in favour of the desirability of the matter ... future Sir William wrote fifty years ago that *Garjan* ... found a perfect substitute in the arts for the ... now much used in the preparation of ... paints In the coarser kinds of house and ... is used as an excellent substitute for Linseed o... highly of the property of *garjan* in preserving wood ... of insects, its defects are slowness of drying, ... liability to being brittle

TESTS FOR GARJAN, COPAIBA AND ... Watson says. "Its entire solubility in ...

31

Divi-divi, or Libi-dibi see Cæsalpinia ...
LEGUMINOSÆ

DOCYNIA, *Dcne* (no descr...

Docynia indica, *Dcne* *Fl Br Ind* ...

Syn.—PYRUS INDICA *Roxb* ...
INDICA *Spach*

Vern.—*Sopho* KHAS ...

References.—*Kew* ... *I 44 Gamb* ... *Darjeeling* ...

Habitat.—A small tree ... to 6,000 feet) ... (5,000 feet) to Burma

Food.—... 1 to 2½ inches in diameter ... has a ... quince flavour ... The ground ... that state ... be, when ... begin to ...

Dock, see ...

Dodder, see ...

...

Dodecadenia ...

Syn ...

References ...
Gamb ...

... ı
... s
... r,
... d
... ı.n
... mon
... ARY
... nd
... and
... njab,
... is met
... n from
... ox (10)
... of the
... e upper

... illed for
... ted in this
... these skins
... and much
... r coats
... actual

... y

True Wolf.
735
Indian Wolf.
736
Jackal
737
Indian Wild Dog
738
Malay Wild Dog
739
Indian Fox
740
Hoary Fox.
741
Desert Fox.
742
Common Fox.
743
Tibetan Fox
744

SKINS.
745

FOOD.
746

TIMBER. 724

Habitat.—A moderate-sized tree of the Temperate Himálaya from Kumáon eastward to Burma.

Structure of the Wood.—Not known to be of any important use.

DODONÆA, *Linn.; Gen. Pl., I., 410 & 1000.*

A genus of some 40 shrubs (rarely trees); only one of which occurs in India, but the literature of that species has been disfigured through its having been described under many names. The genus is named in honour of Dodonæus (Rembert Doddens), a famous botanist and physician.

[SAPINDACEÆ.

725

Dodonæa viscosa, *Linn.; Fl. Br. Ind., I., 697; Wight, Ic., t. 52;*

Syn.—D. DIOICA, *Roxb.*; D. ANGUSTIFOLIA, *Linn. f.*; D. BURMANNIANA, *DC.*; D. PALLIDA, *Miq.*; D. MICROCARPA, *DC.*; D. WIGHTIANA, *Blume*; D. PENTANDRA, *Griff.*; PTELCA VISCOSA, *Linn.*; DODONEA SPATHULATA, *Sm.*; D. ARABICA, *Hochst.*

Vern.—*Aliár* (Plains of Northern India), HIND.; *Sanatha*, HAZARA; *Sanatta, mendrú. ban mendú, sánthá, mendar*, PB.; *Ghuráske, vera-, vena (shumshad?)*, TRANS-INDUS; *Ghuraskai* (or *ghoráskai*), *wuraskai*, PUSHTU; *Mirandú*, KANGRA; *Pipalu*, SIMLA; *Banderu*, C. P.; *Bandurgi* (Kanara), BOMB.; *Lutchmi* (according to Dalz. and Gibs.), MAR.; *Dáwa-ka-jhar* (according to Graham), BELGAUM; *Bándári, zakhmi* (according to Dymock), BOMB.; *Virali* (in Ceylon), TAM.; *Bandaru, golla pulleda, bundédu*, TEL.; *Bandurgi, bandrike* (*bandu*, according to Cameron), KAN.; *Eta-werella* (Trimen), SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 324; Voigt., Hort. Sub. Cal., 96; Brandis, For. Fl., 113; Kurz, For. Fl. Burm., I., 287; Gamble, Man. Timb., 101; Thwaites, En. Ceylon Pl., 59; Dalz. & Gibs., Bomb. Fl., 36; Stewart, Pb. Pl., 31; Aitchison, Cat. Pb. and Sind Pl., 34; Fl. Andh. by Sir W. Elliot, 22, 61; Stewart, Bot. Tour in Hazara; Dymock, Mat. Med. W. Ind., 2nd Ed., 191; Baden Powell, Pb. Pr., 578; Atkinson, Him. Dist., 338; Indian Forester, II., 390; V., 13, 32; VI., 238; VIII., 30, 35; IX., 357, 469; XII., 551; Bomb. Gaz., XV., 68; Gazetteer, Dera Ismail Khan, 18; Settlement Rep., Hazara, 95; Gazetteers:—Banu, 23; Shahpur, 69; Hoshiarpur, 12; Peshawar, 27; Rawalpindi, 12.*

Habitat.—An evergreen shrub, met with in the North-West Himálaya, from the plains up to 4,500 feet, in the Panjáb, Sind, and South India (ascending to 8,000 feet, and attaining here the size of a small tree); also in Burma, and planted throughout India as a hedge.

MEDICINE. Leaves. 726 Wood. 727 Plant. 728

Medicine.—Said to have febrifugal properties. The LEAVES are viscid and have a sour bitter taste, from which fact it is in Jamaica called the "Switch Sorrel." Lindley (*Veg. King., 384*) says the leaves are used in baths and fomentations. The WOOD, he adds, of **D. dioica** is carminative, and **D. Thunbergiana** is said to be slightly purgative, febrifugal, and aromatic.

SPECIAL OPINIONS.—§ "This PLANT has been identified for me by Dr. Dymock. It grows about Belgaum. Dr. Graham, in his *Catalogue of Bombay Plants*, mentions that **D. Burmaniana** is known in Belgaum as *Dáwá-ká-Jhár*. It is believed that the powdered leaves of *Bendugi* applied over a wound will heal it without leaving a *white* scar. It is applied in burns and scalds; said to be useful also in rheumatism. Dr. Dymock gives its Bombay name as *Zakhmi*, from which it may be implied that it is used in the treatment of wounds" (*Surgeon-Major C. T. Peters, M.B., Zandra, South Afghánistan*).

FODDER. Leaves. 729

Fodder.—Stewart says the LEAVES are hard and dry, and are only eaten by cattle when very hungry. Reported to have not agreed with the camels at Thal, Afghánistan, during the late campaign.

TIMBER 730

Structure of the Wood.—Sap wood white, heartwood extremely hard and close-grained, dark-brown, with an irregular outline. It is used for engraving, turning, tool-handles, and walking-sticks, and the branches to support the earth of flat roofs. It is likely to be important in reclothing denuded tracts like the Siwálik hills of Hoshiárpur.

DOMESTIC USES. Manure. 731 Leaves 732 Twigs. 733

Domestic [illegible] in Madras [illegible] sively used [illegible] The name *b* [illegible] the ease with which it may be ignited.

Dog rose, see Rosa canina, *Linn.*; ROSACEÆ.

Dogs, Wolves, Jackals, and Foxes; *Blanford's Fauna of British India, pp. 134—155.*

734

It is not proposed to discuss here the probable history of the domesticated dog or even the forms of it met with in India. The reader is referred to Darwin's *Origin of Domesticated Animals and Plants*. The so-called wild dog of India is, however, more nearly allied to the wolf and the jackal than to the domesticated dog, and is more difficult to tame than either of these animals. This remark is made in order to [illegible]

True Wolf. 735 Indian Wolf. 736

[illegible] stan and Gilgit. The INDIAN WOLF (2) (C. pallipes) is common south of the Himalaya in the open country, but is rare in wooded or hilly [illegible]

741 Desert Fox. 742 Common Fox. 743 Tibetan Fox. 744

while the INDIAN DESERT F[illegible] semi desert regions of Wester[illegible] and North-West Provinces [illegible] with on the Western Himal[illegible] about 5,000 feet to the limits o[illegible] (V. ferrilatus) appears to oc[illegible] Himálaya as at Lassa. Dr. Stoliczka, however, mentions it in the upper basin of the Sutlej.

SKINS. 745

Skins.—[illegible] their s[illegible] work [illegible] Thus [illegible] valued. The Jackal's skin is made into caps, and the Fox's [illegible] for coats, rugs, &c. Definite information is, however, not available as to the extent these skins are utilised nor of their relative [illegible]

FOOD. 745

Food.—Dog's Flesh.—Being carnivorous most of these animals carry off and devour domesticated animals, the wolf having been often known to

FOOD.

eat even children. The Bengal fox lives largely on fruits, such as those of Grewia, Zizyphus, &c.; also field rats, lizards, &c The late Mr. A. de Rœpstorff refers to the fact that the Andaman domesticated dog lives largely on cocoa-nuts, while those of the orange groves of the Khásia hills are fed like pigs on oranges. In the Nága hills and, indeed, throughout India, the dog is mainly fed on rice. But with the Nágas this is so on purpose, as the dog constitutes an important item of human food. Sheep and goats are rare in the Nága country owing to the preference paid to dog's flesh. Before being killed, the dog is often made to eat as much rice as possible. Soon after he is killed and cooked, the contents of the stomach being considered a special luxury.

Dog's Flesh. 747

Dog-wood, see Cornus sanguinea, *Linn.*; Vol. II., No. 1975, p. 572.

DOLICHANDRONE, *Seem.*; *Gen. Pl., II.*, 1046.

748 **Dolichandrone falcata**, *Seem.*; *Fl. Br. Ind., IV.*, 380; BIGNONIACEÆ.

Syn.—SPATHODEA FALCATA, *Wall.*; BIGNONIA SPATHACEA, *Roxb.*; B. ATROVIRENS, *Roth.*

Vern.—*Hávar*, OUDH; *Mendal, manchingi*, BANSWARA; *Kanséri*, MEYWAR; *Mersingh, bhil*, C. P.; *Messinge, kanseri, mendal, manchingi*, BOMB.; *Mersingi*, MAR.; *Karanjelo*, KURKU; *Kadatathie*, TAM.; *Udda, wodi*, TEL.; *Nir pongilam*, MALAY.

References.—*Roxb., Fl. Ind., Ed. C.B.C.*, 492; *Brandis, For. Fl.*, 350; *Beddome, Fl. Sylv., t.* 71; *Gamble, Man. Timb.*, 276; *Dalz. & Gibs., Bomb. Fl.*, 160; *Indian Forester, III.*, 204; *Bomb. Gaz., III.*, 201.

Habitat.—A small deciduous tree, met with in Oudh, Rájputana, Central and South India.

FIBRE. Bast. 749

Fibre.—A blackish coarse BAST fibre, obtained from this plant, was sent to the Amsterdam Exhibition by the Forest Department of Madras.

MEDICINE. Fruit. 750

Medicine.—A decoction of the FRUIT is used medicinally.

TIMBER. 751

Structure of the Wood.—Whitish, hard, close, and even-grained, seasons well, and becomes shining and glossy; it has no heartwood. Annual rings indistinct. Is used for building and agricultural purposes.

DOMESTIC. Fruit. 752

Domestic Uses.—The FRUIT is placed by the Hindús on a bridegroom's waist.

753 **D. Rheedii**, *Seem.*; *Fl. Br. Ind., IV.*, 379.

Syn.—SPATHODEA RHEEDII, *Wall.*; *Wight, Ic., t.* 1339.

Vern.—*Thakutma*, BURM.; *Deva-danga* (*dannga*), SING.

References.—*Kurz, For. Fl. Burm, II.*, 234; *Beddome, Fl. Sylv. Man.*, 168; *Rheede, Hort. Mal., VI., t.* 29; *Liotard, Dyes*, 33.

Habitat.—A small tree of Burma, Malabar, Ceylon, and the Andamans

FIBRE. 754

Fibre.—Yields a fibre similar to that of the preceding.

TIMBER. 755

Structure of the Wood.—White, soft.

756 **D. stipulata**, *Benth.*; *Fl. Br. Ind., IV.*, 379.

Syn.—SPATHODEA STIPULATA, *Wall.*; BIGNONIA STIPULATA, *Roxb.*

Vern.—*Petthan, mahlwa* (*bet-than* of Mason), BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C.*, 494; *Kurz, For. Fl. Burm., II.*, 234; *Gamble, Man. Timb.*, 726; *Mason's Burma & Its People, app.* 411, 543, 794.

Habitat.—A moderate-sized deciduous tree of Burma and the Andaman Islands.

Structure of the Wood —Heartwood orange-red, beautifully mottled, hard, close-grained, weight 54 58lb a cubic foot The wood is used for bows, spear handles, oars, and paddles Major Ford says it is a durable wood for house-posts, and makes good furniture

TIMBER. 757

DOLICHOS, *Linn*, *Gen Pl*, *I*, *540*

for the common haricot a plant once on a time viewed as of Indian origin (*Conf* w th the remarks at page 185)

Dolichos biflorus, *Linn*, *Fl Br. Ind*, *II*, *210*, Leguminosæ

758

Horse Gram or Kooltee

Syn —D uniflorus, *Lam*, Glycine uniflorus, *Lam*

Vern —*Kulthi* (or *kulti*), *gahat* Hind, *Kurti kalai*, Beng, *Horec*, Santal, *Gahat*, *kalath kulthi*, Kumaon, *Kalatt*, *kulat*, *ki lt kol*

Dolichos), *kulattha* (according to Dutt) *kolutha* (Birdwood), Sans

Note —The name *khurti*, or *khulti*, is in the North West Provinces also given to Cyamopsis psoralioides, *DC*, which see Vol II, p 673, No 2514

References —*Roxb*, *Fl Ind*, *Ed C B C*, *563*, *Dalz & Gibs*, *Bomb Fl* ... *Sind Pl 49*, ... *ih*, *185*, *Prof Report on the* ... *C Dutt*, *Mat* ... *40*, *Saidapet* ... *arm*, *1871*, *4*, ... *eport*, *Madras*, ... *Atki ison Him* ... *rdwood Bomb* ... *4*, *(1685) Vol*

91 XVII, *269*

Habitat —According to the *Flora of British India* there are two forms of this plant α (D uniflorus), a sub-erect annual, and β (D biflorus), a more or less twining plant The habitats of these forms are not separately recorded, and Mr Baker (the author of the Leguminosæ in the *Flora of British India*), apparently treats of both collectively when he says that it occurs on the "Himalaya to Ceylon and Burma, ascending

to 3,000 feet in Sikkim; sometimes cultivated. Distributed everywhere in the tropics of the Old World."

VARIETIES. 759

Varieties.—While the writer does not possess the means of testing the accuracy of his opinions by the inspection of specimens obtained from all parts of India, he believes it will be found that a mistake has been made in linking the Himálayan with the plains' plant. **Roxburgh** refers to two forms, one with grey, the other with black seeds, both of which he implies are cultivated in Bengal and Madras. Of the grey-seeded plant (his **D. biflorus**), he remarks that it is erect, with twining branches, and about two to three feet high. He then adds: "I have never found it but in a cultivated state." Again: "This species is much cultivated all over the coast. It requires a dry, light, rich soil. In October and November it is sown either by itself or mixed with **Holcus saccharatus**." In the writer's opinion there would appear to be considerable room for doubt as to whether the grey and the black-seeded forms of **Roxburgh** are the two forms of modern writers, or whether both of **Roxburgh's** plants constitute but cultivated races of one of these forms. In popular works, on economic products, the Horse-gram of Madras is viewed as **D. uniflorus**, and under either of these names (**D. biflorus** or **D. uniflorus**), a pulse is described as grown, one might almost say, in every district of India, but chiefly in Madras and Bombay. It is somewhat difficult to believe that a pulse of the tropical plains could be the same as that of the Temperate Himaláya, of which **Stewart** wrote that it is "grown at 7,000 feet or more." This will appear the more improbable when it is added that the pulse described as met with in these regions is sown and reaped very nearly during the same periods, though in the one case under tropical, and in the other under temperate, influences.

CULTIVATION. 760

Cultivation.—It may be said of the plains that the pulse here dealt with is grown for either of two widely different purposes:—*viz.*, as a green manure, or as food and fodder. It has not been found possible to discover the extent to which the former purpose is pursued by the actual cultivators. The reports on the subject are more directly connected with Government experimental farms, although it would appear as if the experiments described had been the outcome of a recognised native practice. Mr. **Robertson**, in several of the Saidapet Farm Reports, deals with the advantages likely to accrue from the use of this pulse as a green manure.

Green Manure. 761

He writes: "The action of the green manure is two-fold. *First*, the substance of the plant decaying in the soil leaves behind a large quantity of prepared food, ready for absorption by the roots of the succeeding crop; *secondly*, when ploughed in, the structures of the green crop add directly to the amount of organic matters in the soil, and thus improve its mechanical condition, increasing its power of absorbing and retaining moisture, and increasing, in the case of stiff soils, their friability." In another place he remarks: "In several fields, crops were ploughed in, during the past season, and although it is not possible to state what actual value the proceeding had, for no experiments were made, yet estimating the value of such a manure at R4 per ton, it was necessary to produce about 4,500lb per acre to cover the cost of growing it." In still another report Mr. **Robertson** says: "The horse-gram (**Dolichos uniflorus**) is well suited for culture on sandy soils, for ploughing in, as a green manure." "Last dry season we raised crops that yielded from 2,000 to 3,000lb of plant per acre in a period of about twelve weeks, during which the rainfall did not amount to one inch. In the neighbourhood around Madras, the 'summer crops,' on dry sandy land, are exceedingly precarious; on the average we have not more than one year in four, in which crops sown in June or

July yield [illegible] that [illegible] instead [illegible] (Pennisetum typhoideum) [illegible] land, that the [illegible] be to clean the soil thoroughly [illegible] ploughing in. [illegible] yield per acre from [illegible] would prepare the soil [illegible] crops."

The advantages [illegible] extolled by various writers. [illegible] dures from [illegible] of about [illegible] per [illegible] weather. [illegible] highly as a [illegible] cried in the scale. [illegible] of the year. [illegible] requires but one [illegible] obtained, the seeds [illegible] of germinating [illegible] contended that a [illegible] sow horse-gram [illegible] as fodder. [illegible] advancing [illegible] even though the [illegible] manure. Mr. [illegible] moisture present in the soil at harvest [illegible] sow the crops [illegible] there may be no [illegible] this system is that the [illegible] the dry season." [illegible] horse-gram [illegible] March. He adds "[illegible] It will be seen that [illegible] obtained [illegible] be a great boon to the [illegible] grain as far as possible [illegible] manure to their [illegible] the harvest of their [illegible] ised as at present."

NATURE OF SOIL, SEASONS OF SOWING, AND REAPING [illegible] OF HORSE-GRAM.—The [illegible] to the requirements of this plant [illegible] in the published statements [illegible] be accounted for by the difference [illegible] conditions. In the passage quoted above [illegible] that this pulse is grown on a "dry, light [illegible] difference of opinion seems, however, [illegible] features of horse-gram cultivation, [illegible] cost of cultivation, &c.) have been [illegible] ing brief review, province by province, may [illegible]

Madras.—Mr. Nicholson (*Manual of Coimbatore*) [illegible] ryots were in former days allowed to take [illegible] lands for [illegible] cultivation at a quarter the [illegible] [illegible]

DOLICHOS biflorus.

Horse Gram or Kooltee (or kûlti).

CULTIVATION.

of cattle; they are usually ploughed, sown, and the seed covered by a second ploughing if there be time, but if not, the seed is simply scattered broadcast over the natural surface and then ploughed in. As it requires only one good rain after appearing above ground, it frequently gives a fair crop when nothing else can live. When the south-west monsoon rains are too late for *Kambû* it is frequently sown as a substitute in September, but it is also sown largely in November after the first burst of the north-east monsoons. It is pulled up by the roots, thrown into heaps, and then trodden out by cattle. The yield is up to 1,200lb." In a recent report contributed by Mr. H. Sewell, Collector of Cuddapah, there occurs a similar statement: "*It requires no cultivation beyond ploughing, and grows on any soil.*" Mr. H. Goodrich, Collector of Bellary, writes:—"A mixed soil is best suited for the crop. The fields should be ploughed and harrowed once or twice, but not irrigated nor (generally) manured." Mr. Robertson's experience of the pulse on the Saidapet Experimental Farm has been indicated by several passages quoted above, but with regard to the soil, &c., it may be as well to convey his meaning still further. He says it is "a valuable fodder-producer for inferior sandy soils." "The ease with which it may be cultivated recommends it most highly." But several Madras writers give a very different account of the requirements of this plant. For example, in the Survey Settlement Report of South Arcot (see *Selections from the Records of the Madras Govt., 1865, p. 109*), there occurs the following passage regarding "horse-gram (Dolichos uniflorus)": "The land is ploughed four or five different times after the month of May, and the gram sown between the latter part of August and the end of September. It is gathered in the middle of March." In the Manual of the Trichinopoly District (by Mr. L. Moore), page 72, it is stated that "*Kollu* (Dolichos uniflorus), or horse-gram, is a four-months crop, being sown in October and reaped in February. It is a precarious crop, as it requires frequent showers, and is destroyed equally by excessive drought or moisture. It is grown to a considerble extent in the Kulittulai Taluk, but not much elsewhere." Writing of Trichinopoly recently Mr. H. Willock says of *Kollu* that "the area of this grain under cultivation is about 27,604 acres, of which 1,297 acres are *fasli* lands. It is a four-months crop, sown in October and reaped in February." "It is cultivated generally in sandy soils and also in other soils when the season for appropriate crops is over." Of Cuddapah District Mr. H. Sewell gives the extent of cultivation in 1887-88 as 14,755 acres, and the outturn 17,70,600 measures. He adds: "It is sown in October and reaped in February." Of Bellary District Mr. H. Goodrich writes of 1887-88, that "the total area under cultivation of this crop is estimated to be 106,805 acres, of which 90,013 belong to Government and 16,792 are *inam*. The season for sowing is from the 3rd August to 7th October, and that of harvesting from 20th December to 21st February. The lowest estimate for the cost of cultivation is given at R1-12, the highest at R5-8, and the average at R3-2-7 per acre. The profits vary from 4 annas (lowest) to R4-4 (highest) per acre; the average being R1-0-2 per acre."

Area. 765

Seed. 766

Yield. 767

The amount of seed per acre and the yield is variously stated, but of Madras Mr. Robertson wrote in 1871 that in one experiment, 35lb an acre was sown in August and yielded in October 5,640lb of green fodder. Another experiment with 24lb an acre, sown in October, gave in March 450lb of pulse and 1,800lb of straw. But reference has already been made to Mr. Robertson's experiments of cultivating for fodder or green manure horse-gram sown in February and March. The present notices regarding the Madras cultivation of horse-gram may there-

CULTIVATION.

... the passage from the Sa dapet Farm Manual and ... The soils of ... is plant like ... can mature ... t unless the ... of lime, the ...

Generally, in preparing land for gram, the following method is adopted:—"After ploughing 4 to 6 inches deep, and harrowing, the seed is sown in lines, if the season is unfavourable and the soil poor, close together, if the reverse, far apart, at the rate of from 30 to 40lb per acre. During growth, the crop should be bullock-ho... demand, and hand-hoed at least once ... diately the flower appears and remo... growing a ton of fodder is about R3. ... possesses a pleasant aromatic smell w... 75 per cent. of its weight in curing."

BOMBAY. 768

sown with *bájri* in June and ripens in N... ... and in soup and porridge, and is also given to horses ... ove, in ... assage ... *Kulthi*, ... been, ... in the ... pease ... The ... other

N.-W. PROVINCES. 769

extent to which this pulse is grown in these Provinces, and the common name *khulti* here more frequently denotes Cyamopsis psoralioides than

DOLICHOS biflorus.

Horse Gram or Kooltee (or kúlti).

CULTIVATION.

Dolichos biflorus. It may be inferred that very little of Dolichos biflorus is actually cultivated in the Provinces, from the fact that it is not described in Messrs. Duthie and Fuller's *Field and Garden Crops.* Mr. Atkinson, however, in his *Himálayan Districts, pp. 343, 460, 696,* says: "Horse-gram—*Gahat, kalath,* the *kulthi* of the plains. The horse-gram is occasionally grown in the hills up to 6,000 feet, and in the sub-montane tract. In the Bhábar it ripens in October." A somewhat striking feature of this pulse or bean is the absence of any allusion to it in the *Ain-i-Akbari.* Abul Fazl, the author of that useful record of Akbar's times, gives particulars of all the grains, pulses, oil-seeds, vegetables, flowers, and fruits known to the Emperor. Among the pulses and vegetables there occurs *Mung, Máth,* and *Moth*—the first two are forms of Phaseolus Mungo, and the last is P. aconitifolius: then *Adess,* the lentil (Lens esculentus) is referred to, and *Nakhúd,* the common gram (Cicer arietinum). *Lobiyá* is also mentioned, but whether we are to translate that as Vigna Catiang or as Dolichos Lablab seems doubtful. At all events, no place is given to *kulthi* and, indeed, it is questionable if that pulse was known to the Persian writers. This fact is difficult to account for, if we admit that the plant of the Himálaya and of Northern India is the horse-gram of Madras, but the absence of any knowledge of it admirably corresponds with the present cultivated area of the plant, *viz.*, in South India and Bombay, the portions of India over which the Emperor Akbar was never able to extend his supremacy. We might, indeed, from this fact be pardoned the assumption that the true habitat of Horse-gram should be looked for in South India rather than on the Himálaya.

History of Kulthi 770

PANJAB. 771

Panjáb.—Of the Panjáb Stewart says: "It is commonly cultivated for its pulse in the Himalaya up to 7,000 feet or more. Occasionally grown outside, near the base of the hills at Ambála (*Edgeworth*)." "*Kulth* (Dolichos uniflorus)" is referred to in the *Gazetteer of Hoshiarpur District* (*page 94*) as a *kharif* crop "sown on the poorest hill slopes, which look as if they could produce nothing but stones." In the *Gazetteer of Simla* (*page 55*) *kulthi* is alluded to as "the most common pulse, growing freely, even upon high meagre soil. The grain is hard and indigestible, mottled with specks of a dark colour. It is eaten in the form of *dál*." On a further page it is again alluded to: "*Kulat* or *Kolath* (Dolichos uniflorus—horse-gram) is grown in the inferior *bakhil* lands in the lower villages. Will not grow on the higher lands. Is not sold. Is sown the same time as *Másh*" (=Phaseolus radiatus, *viz.*, sown in July and harvested in October), "but ripens 15 days later. To prepare for eating,—it is soaked in water for 12 hours; then reduced to a *mash* on a stone; then made into round balls and steamed. Another way is to roast the grains and then boil them, adding rice."

CENTRAL PROVINCES. 772

Central Provinces.—In a recent communication Mr. J. B. Fuller says:—"Dolichos biflorus is grown in the southern districts of the Provinces as a cold weather crop. Full details of the area under it are not available, but such statistics as are at hand indicate that its cultivation is of importance only in the Chanda, Bhandara, and Balaghat districts, in each of which it annually covers from 3,000 to 4,000 acres." In the Settlement Reports, referred to under the paragraph of references, mention is made of this pulse, but Mr. Fuller's brief note gives the main facts.

BENGAL. 773

Bengal.—Horse-gram is very little cultivated in the Lower Provinces. It is said to be grown to a limited extent in Shahabad as a fodder, but "not grown in lower Bengal." It is, however, "largely cultivated in Chutia Nagpúr Division, on good land. It is usually sown along with *sirguja* in August, and receives the same treatment, and is harvested in November-December. The average quantity of seed sown is ten seers per acre,

Horse Gram or Kooltee (or kulti) (*G. Watt*) DOLICHOS biflorus

CULTIVATION

and the average produce two maunds, valued at R3 The seed is eaten as *dál*, or ground into *satu* after being roasted In Chutia Nagpur, proper, about 1½ per cent, of the cultivated area is sown under this crop *In Khoorda,* Pooree District, kulthi is usually grown as a second crop* on paddy lands" The Rev A Campbell writes that by the Santals this pulse "is extensively cultivated on good high lands It is eaten in the form of *dal* and also as *satu* To prepare *sátu*, the pulse is roasted and then ground It is eaten without being further cooked"

AREA 774

AREA UNDER HORSE GRAM —In some of the above passages reference has been made to the extent this pulse is cultivated With the exception, however, of Madras and Bombay, it is not of such mportance as to require being regular therefore, be furnished for to present date has range returns for Bombay may between one-third and one-fourth of that area as under the pulse In 1887-88, the total of these two Provinces was close upon 1,850,000 acres The Central Provinces have, perhaps, about 10,000 acres, and in the [illegible] is probable that the rest of acres at the outside, so that tive of the Himalaya, its

TRADE. 775

available, and it is only hasers that *the gram of Madras* — the *Horse-gram* here discussed — is a perfectly distinct pulse from the *gram* or *Bengal gram* of most writers (For GRAM see Cicer arietinum. *Vol II, No 1061, pp 274 to 284*) This caution is the more necessary, since every trade journal and agricultural publication is urging the importance of India as a source of pulses and lentils, &c, to be used as cattle food The importation into Europe of the horse-gram of Madras under the false impression that it was the same as Bengal gram might seriously injure the progress of trade, and the sale of the pulse Lathyrus [illegible]

[illegible] trade in horse-gram may be here mentioned, *viz*, that the Madras crop mainly comes into the market in March, April and May, while the bulk of that of Bombay and Upper India would appear to be available in November and December

HUMAN FOOD. Seeds 776

EXTENT TO WHICH USED AS HUMAN FOOD —It is scarcely necessary to refer [illegible] ant passage [illegible] deemed a su[illegible] after being b[illegible] in the form of a meal variously prepared Dalzell [illegible] hat "when a spur or ergot

CATTLE FOOD. Stems. 777 Leaves. 778 Beans. 779 Split Husk 780

nd horses the STEMS and [illegible] plant are highly valued all over India, and the BEAN appears to constitute the chief article of diet given to horses in the Madras Presidency The split husk also is used in Madras as a cattle-food Numerous experiments have been performed to test the value of *kulthi* both as a fodder and a cattle-food Mr Robertson ascertained the merits of boiled as compared with steeped horse-gram on draught cattle. He reports —"A lot of 16 draught cattle similarly worked were equally

* See Taylor's Settlement Report on Khoorda Government Estates

CATTLE-FOOD.

divided. Besides their usual fodder one lot got 12 pounds of boiled gram and 12 pounds of ground nut-cake, and the other lot received daily 12 pounds of steeped gram and 12 pounds of ground nut-cake. The results were as follows:—

Animals on Boiled Gram.

	Pounds.
Weight at the commencement of the experiment	6,339
Do. twenty-seven days afterwards	6,576
Increase	237

Animals on Steeped Gram.

Weight before the commencement of the experiment	6,310
Do. twenty-seven days afterwards	6,576
Increase	266

A similar series of experiments were performed with horses, and the verdict arrived at was in favour of steeped gram. Mr. Robertson performed a further experiment to test the comparative feeding values of maize and horse-gram. He reports: "for the first few days maize was not readily eaten; however, at the end of a couple of weeks, the cattle ate it freely and continued to increase in weight, until at the termination of the experiment, they had increased 71 pounds in weight. The other pair ate gram from the first, but they never made the progress observed by the pair fed on maize, and at the termination of the experiment had only increased 3 pounds in weight." This fact might to some extent be accounted for by the beneficial effect of a change, irrespective of the merits or otherwise of the maize diet.

Another series of experiments were conducted in order to determine the value of gram fodder in comparison with grass and cholam fodder as food for sheep. "The animals fed on grass only gave an increase of 8·26 pounds per each 100 pounds of their live weight, whilst those fed on gram fodder gave 14·5 pounds, and those on cholam fodder 15·58 pounds. The grass was the inferior stuff usually cut for horses." In the *Khandesh Gazetteer* (*p. 152*) it is stated that many persons prefer *kulthi* to gram (presumably Bengal gram) in feeding horses. It is much to be regretted that no one appears to have published the results of definite experiments to test the relative merits of Bengal gram (**Cicer arietinum**) and Horse-gram (**Dolichos biflorus**). Such experiments would afford exporters the means of judging whether they should commend most, the Bengal or the Madras staple article of horse food, to European dealers. The chemical analysis taken from *Professor Church's Food-Grains of India* (given below) would, however, justify the preference being shown to Bengal gram:—

CHEMISTRY. 781

CHEMISTRY OF THE HORSE-GRAM.

Professor Church publishes the following table of analysis:—

Composition of Horse-gram.

	In 100 parts, unhusked.	In 1 lb oz.	In 1 lb grs.
Water	11·0	1	333
Albuminoids	22·5	3	262
Starch	56·0	8	420
Oil	1·9	0	133
Fibre	5·4	0	378
Ash	3·2	0	224

The Professor concludes from
2 7, and the nutrient coefficient 83
one th rd of its weight of phosph
... the ... are ren ted in some districts, ...

value 84

Oil —The BEANS are said to yield an oil, of which little is known.

Medicine —Stewart says the SEEDS are used medicinally in the Panjab S Arjun, in his *Bombay Drugs*, *p* 40, has the following remark about *Dolichos uniflorus*. "There are two varieties of this—the red and the white Both are used for similar purposes The DECOCTION is used by native females in leucorrhœa and menstrual derangements; it is also given to parturient females to promote discharge of the lochia"

Special Opinion —§"Sanskrit writers recommend the use of the pulse of this plant as a demulcent in calculus affections, cough, &c Its employment is said to reduce corpulence The wild variety is said to be particularly serviceable in eye diseases" (*U C Dutt, Civil Medical Officer, Serampore*)

Food —The PEA is eaten by the poorer classes of natives, and the PODS and PEAS are also eaten by horses and cattle The STRAW is a much prized fodder

OIL. Beans. 782 MEDICINE. Seeds. 783 Decoction. 784 Pulse. 785 FOOD. Peas. 786 Pods. 787 Straw. 788

Dolichos cultratus; *Syn* for Dolichos Lablab

D. fabæformis, *L'Herit*, see Cyamopsis psoralioides, *DC*

D. Lablab, *Linn.*, *Fl Br Ind*, *II.*, 209 789

Vern —...

... *g* (? Vigna Catiang), *kala lobia*, PB, *Wall* (according to Birdwood), SIND, *Pauti*, *valpapri* or *valapapadi* BOMB, *Paote*, *val*, MAR, *Vál*, GUZ, *Mochai*, TRICHINOPOLY, *Bili manavare*, or *man avare*, Mysore ...

NOTE.—The names *Lobia* and *lóbiyá* given above for this species are in the writer's opinion wrongly so applied, and should be assigned to Vigna Catiang.

The Sim and Lobiya.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 560; Dalz. & Gibs., Bomb. Fl. Supp., 23; Stewart, Pb. Pl., 67; Aitchison, Cat. Pb. and Sind Pl., 49; Sir Walter Elliot, Fl. Andhr., 10, 15, 16, 175; Rev. A. Campbell, Econ. Prod. Chhutia Nagpur, Nos. 9249 and 8155; Stock, Account of Sind; Church, Food-Grains of India, 161; DeCandolle, Origin Cult. Pl., 346; Murray, Pl. and Drugs, Sind, 127; Mason, Burma and Its People, 466; Atkinson, Him. Dist., 696; Duthie & Fuller, Field and Garden Crops, II., 23; Lisboa, U. Pl. Bomb., 153; Birdwood, Bomb. Pr., 119; Ain-i-Akbari, Blochmann's Transl., 63; Jour. Agri-Hort. Soc., V. (New Series), p. 37; Indian Forester, IX., 203.*

Habitat.—Wild and cultivated throughout India; ascends to 6,000 or 7,000 feet on the Himálaya. This climber may be seen growing along the borders of fields, which contain tall crops being left to twine round the plants near the margin. In some parts of the country the castor oil plant is a favourite support. The *shím* is also grown very commonly round houses, being allowed to climb on the walls and roof.

HISTORY. 790

History.—Some idea of the probable history of **Dolichos biflorus** may be gathered from the series of quotations given above from numerous authors, and from the very extensive collection of vernacular names, most of which seem to be derived from the Sanskrit *Kuluttha*. The remarks made in the paragraph devoted to the cultivation of that species in the N.-W. Provinces may be specially read in this connection. M. A. DeCandolle (*Origin of Cultivated Plants*) deals with two (or what the writer regards as only one) species of **Dolichos**, *viz.*, **D. Lablab**, *Linn.*, and **D. Lubia**, *Forskal.* He does not treat of **D. biflorus**, although it is perhaps a more important cultivated plant in India than **D. Lablab.** The line of reasoning urged by DeCandolle seems largely to turn on the origin of the word *lubia*. He says: "Oriental scholars should tell us whether *lubia* is an old word in Semitic languages. I do not find a similar name in Hebrew, and it is possible that the Armenians or Arabs took *lubia* from the Greek λοβος, which means any projection, like the lobe of the ear, a fruit of the nature of a pod, and more particularly, according to Galen, **Phaseolus vulgaris**. *Lobion* (λοβιον) in Dioscorides is the fruit of **P. vulgaris**, at least in the opinion of commentators. It remains as *loubion* in modern Greek, with the same meaning." The word *Lobíyá* occurs among the list of autumn crops, known to Akbar. According to some modern writers it is, in Upper India, almost generic for beans, although applied more especially to two plants, *viz.*, **Vigna Catiang** and **Dolichos Lablab.** The former comes into season in the autumn (*kharif* crop), while in the N.-W. Provinces and the Panjáb the latter is sown in autumn and reaped in February and March, so that it is a spring (*rabi*) crop. These seasons do not, of course, apply to all parts of India, since, for example, in Assam and some parts of South India, **D. Lablab** ripens in December. The *Ain-i-Akbari* (a work written in Persian) describes the crops grown in Delhi and Agra during the reign of the Emperor Akbar. A pulse, *Lobiyá*, is there spoken of as a *kharif* crop. As at the present day, so in all probability in Akbar's time, this would have been **Vigna Catiang.** This is of importance, since the word *Lobíyá* appears to be of Persian not Sanskrit importation into the languages of India. Persian scholars do not seem to share M. DeCandolle's ideas regarding a derivation of *Lobiya, lubiyá, lúbiya,* or *luba,* from λοβος. The word is accepted as of pure Persian origin, and in Johnson's Persian, Arabic and English Dictionary is given as "a kind of pulse." It may here be added that *labáb* in Arabic means "green fodder." But even if the Persians borrowed the word from the Greeks, the contention here advanced would still remain in its full force. It came to India through the Persians. Hence the writer is disposed to restrict the word *lobíyá* to **Vigna Catiang**, and if this proves correct

Lobiya. 791

it is probable none of the species of Dolichos were known to the Persian or Arabic writers of classic times. This conclusion would assign to the species of Dolichos an Indian origin, an idea practically confirmed by the almost universality of certain derivative names in the languages of India

In the *Gazetteers of the North-Western Provinces* the name *lobíyá*

usually called *rausa*. *Rawas* and *rausa* are names given throughout these provinces for Vigna Catiang. Of the Meerut District it is said

crop, but that *masina* is *biya*, Dolichos sinensis" names of a *kharif* crop, *Gazetteer* as that of a spring crop. This latter statement may be the result of a mistaken iden- but may possibly f all the districts a spring pulse, (*IX.*, 203), *lobia*, Vigna Catiang, is referred to as one of the most useful of the bean tribe for rainy season cultivation. It is said to continue to yield till the beginning of the cold season.

Of the Panjáb, Stewart says Dolichos Lablab is known as *catjang* is the only writer who says so

nacular names of *keo*, *katun*, or *kala mung*. There would seem little doubt but that this is the *kala lobia* of Stewart, and it is probable Stewart added the word *lobia* (an Anglo-Indian generic name for beans) much after the same principle as Baden Powell gives the paragraph heading *Lobiya* to an account of a Kashmír bean, the botanical name of which he gives as "Phaseolus vulgaris, *L.*, and, P. lunatus, *L.*, red and white haricot beans (mixed)." "These, he

D. 792

HISTORY.

trade in meeting the European demand. It can in no way be said to be a regular article of native cultivation, and the name *loba*, if ever assigned to it, must be viewed as but a modern adaptation of a semi-generic appellation for introduced peas or beans. But to return to the mention of the word *lobiya* in Panjáb recent publications. In the *Gazetteers* of the various districts, **Dolichos Lablab** is practically ignored, while **Vigna Catiang** is frequently mentioned. That pulse is, for example, *rong* in Kangra, *ranyan* in Simla, *rawan* in Montgomery, and *lobia* or *chaula* in Gurgáon. Thus *lobia* appears as a synonym along with other and more distinctly Indian names for **Vigna**. *Chouli* is a very frequently used Hindústani name for it; *Chouli* in Chanda, *chaunro* in Sind, *Chouli, chola, safed lobeh* (white *lobeh*), *hurrea lobeh*, and *gat-vál* in Bombay. Thus ever here and there the name *lobíyá* crops up, in connection with **Vigna**, though practically no authentic case is known of its being given to **Dolichos Lablab**. In South India that name scarcely exists, except perhaps with Europeans. **Vigna Catiang** is *alasandi* in Kánarese, *kárámanalu, alachandalu*, or *bobbarlu* in Telegu, and passing up the east coast to Orissa it becomes *lobiya-chhai* in Uriya.

The final conclusions which the writer has arrived at regarding the word *lobíyá* may be expressed briefly:—(1) It is incorrectly applied to any species of **Dolichos** or **Phaseolus**; (2) it is of Persian origin and may by adaptation have been assigned by the early Persian and Mogul conquerors of India to **Vigna Catiang**; but (3) as used by the Indian market gardeners of the present day it is a generic name for any introduced pulse or bean and is in no way specific. A similar expression exists in the use of **Lablab** for the vegetable or unripe pods of beans such as those of **Dolichos Lablab**. The probable origin of **Vigna Catiang** and its claims to being the true *Lobiya* of Indian (Persian) writers will be dealt with in a further volume of this work.

Having thus in a measure disposed of the confusion caused through the association of *lobíyá* with **Dolichos Lablab**, there remains little to be said regarding the history of **Dolichos Lablab** itself. The existence of it as a wild plant, combined with the extensive series of vernacular names, especially those of Lower, Eastern, and Southern India, leave no room for doubt as to its being a native of India, and more especially of the portion of India indicated as the area of its indigenous habitat. The Sanskrit names given to it are doubtfully correct, and although we may be unable to follow **DeCandolle** in the idea that, according to Sanskrit literature, it has been cultivated in India for 3,000 years, there is everything in favour of the supposition that it was a regularly cultivated crop long anterior to the Aryan invasion of India. It may thus, at an early date, have had assigned to it the Sanskrit names from which some of the vernacular names for the plant are clearly derived. This conclusion would considerably enhance the antiquity of its cultivation in India.

CULTIVATION.

CULTIVATION. MADRAS. 793

Madras.—In the Trichinopoly Manual **Dolichos Lablab** is said to be a six months crop: sown in July and August, reaped in February and March. In a report, furnished for the present work, the Collector (**Mr. H. Willock**) says the area of cultivation is 3,934 acres. The annual outturn per acre amounts in value to R10, the cost of production being R5. He adds that it is cultivated on all soils along with the staple food-grains. **Mr. H. Goodrich**, Collector of Belláry, writes that the area in his district under this crop is only 350 acres. It is sown from June to August and reaped from October to December. It is usually sown with other pulses in the proportion of 1 to 5. The cost of cultivation and profit cannot therefore be

CULTIVATION.

kinds of this pulse: white, red, and black. The season of sowing and

to be cultivated "solely for its flat, oblong legumes, which are used in curries" "*Mocces*, Lablab vulgaris, and *Káramani*, Dolichos sinensis, sown in July and August and reaped in January and February on "unirrigated land; often grown as auxiliary crops along with a shorter dry crop, such as *rági* or *cholum*, more common in the delta" It seems probable that the two last mentioned plants are Vigna Catiang. In the

holes made between the plants, two seeds being dropped into each hole

second crop with the *Kharif* millets (*Bajra*) It is also a favourite crop in river beds, and is much grown on irrigated plots as a late extra or catch crop"

PANJAB. 796

Panjáb—The notices regarding this pulse are so brief that the references already made under the paragraph of history (above) may be

CENTRAL PROVINCES. 797

N.-W. PROVINCES. 798

North-West Provinces.—Messrs. Duthie and Fuller (*Field and Garden Crops*) give a brief account of this pulse. They say "there are

DOLICHOS Lablab.

The Sim Bean.

CULTIVATION.

several varieties of this climbing bean, one of the more distinct being that named **D. purpureus**, a separate figure of which is given in *Plate XXXIV. B.*" "Their chief distinguishing characters have reference to the colour of the flowers, the shape and colour of the pods, and the colour of the seeds." "In these provinces," these authors continue, "*sém* is commonly grown along the borders of tall crops, and allowed to twine itself round the plants standing on the margin. The castor oil plant is a favourite support. It is also occasionally grown in little patches round houses, and allowed to trail over the walls and roof. It is never grown as a field crop by itself, since it would require an artificial support which would add too much to the cost. It is used as a vegetable, its long pods, picked in unripe condition, forming a favourite addition to the daily mess of green food. It is seldom if ever grown for its grain." The reference to its climbing on the castor oil plant may be accepted as showing that it is a *rábi* or spring crop. **Mr. Atkinson** says of Kumáon that there are six varieties commonly cultivated in gardens and very occasionally as a field crop.

BENGAL. 799

Bengal.—The same remark as given under the Central, is applicable to the Lower, Provinces. It is not a regular agricultural crop, though few huts exist without at least one plant trailing over the enclosure. The Director of Land Records and Agriculture says: "Different varieties of *shim* or *lablab*, distinguished from one another by colour, size, form, nature of stripes, &c., of the pod, are cultivated all over Bengal as a garden vegetable. A grass-coloured, small variety, of very indifferent flavour, is found wild in the jungle of Madhupur." **The Rev. A. Campbell** (a most painstaking observer) has furnished the writer with a complete set of all the cultivated and wild plants of a large portion of Chutia Nagpúr. Of this pulse he says it is largely cultivated, the legumes being eaten, but he does not appear to have found the plant wild. **Roxburgh**, however, in his *Flora Indica*, says: "Of this species there are known to me five arieties vin a cultivated state, and two wild." Of the two wild plants he calls the one *Ban-shím*, in Bengali, and *Adaví-chikurkai* in Telegu. This he describes as "smooth in every part, and frequently biennial, if not perennial. It is never cultivated, nor any part of it used." Of his other wild form he says: "It is found with the former wild in the hedges, &c., near Samulkota, and differs from it in being very downy; both have red flowers and dark grey mottled seeds. No part of these two varieties is made any use of." Under **Dolichos lignosus**, *Willd.*, he describes some six other cultivated beans. These by the *Flora of British India* have all been reduced to **D. Lablab**, so that, according to **Roxburgh**, there are some thirteen forms of the plant. Of his cultivated forms under **D. Lablab**, **Roxburgh** accepts that known as *Annapa* in Telegu as the most typical. He writes of it: "The whole of this plant has a heavy disagreeable smell, something like the green bug. It is much cultivated in the fields during the cold season, and delights in a rich black soil, which cannot be flooded by rains. Like *Bobra*, it requires three months from the sowing, till ripe; yields in a good soil, about forty-fold. These seeds bear a low price, compared to most other sorts of grain. They are much eaten by the poorer classes, particularly when rice is dear. They are not palatable, but reckoned wholesome substantial food. Cattle are also fed with the seeds, and they are remarkably fond of the straw. It is said to make cows yield much milk." Of the other forms of **D. Lablab**, **Roxburgh** seems to convey the idea that they are garden products and not field crops. Under **D. lignosus** he writes: "I include under the above definition many varieties, some of them hitherto deemed distinct species. All are cultivated during the cold season in the gardens and about the doors of the natives, forming not only cool, shady arbours, but furnishing them with an excellent

CULTIVATION.

pulse for their curries, &c, in the tender legumes In short, these and the four last mentioned cultivated varieties of *Lablab* may be called the [illegible]

ASSAM. 800

Agriculture furnishes the "The *urshu*, or *uri*," grown in almost every village It is nowhere grown as a field crop but is grown on lands

Cattle are never fed
The juice is mixed
throat, &c, due to c
It may be point
according to the b
Lablab, but is more
from Assam to the
The pod of Dolicho
is said to be "flat, linear or oblong recurved, 2—4 seeded and 1½ to 2 inches long, by ½ to ¾ inches broad, tipped with the hooked persistent base of the style" The possibility of a mistake may be accepted as a justification for doubting the propriety of dealing with these plants collectively, the more so since Assam, by the above report, would stand by itself in the record of periods of sowing and reaping The writer may add, however, that he is personally acquainted with Dolichos Lablab, as met with in Assam, and he collected a sample of it even in the Naga hills, there known as *kechu* This latter fact is of very considerable [illegible]

BURMA. 801

Vigna pilosa of modern botanists"
the subject of Dolichos Lablab
"in the Kyaukpyu District it
bears in the cold weather It is,

The Sim or Asiatic Bean.

when about a foot high it is allowed to twine round bamboo trellis work."

AREA. 802

AREA OF CULTIVATION.

It is difficult, if not impossible, to discover the area under a crop which, like the present, exists as a garden climber, each peasant having one or two plants. It is grown all over India, becoming less abundant towards the north than in the southern and western divisions of the country. In Madras and Bombay, however, it is to some extent a field crop. In Madras in 1885-86, there were stated to have been 65,664 acres under the crop, in 1886-87, 78,700 acres, and in 1887-88, 35,724 acres. In Bombay the area appears to be greater. In 1885-86, 72,660 acres, in 1886-87, 91,652, and in 1887-88, 95,188 acres.

The Madras returns for 1887-88 may, however, be incorrect, since ambiguity often exists through the figures of area appearing under different names, such as "beans," "*avarí*," "*mochai*," or "*anumulu*," &c.

CHEMISTRY. 803

Chemical Composition.—In his *Food Grains of India*, Professor Church publishes the results of five analyses of this pulse. He accepts the fourth as fully expressing the character of the grain. The following abstract from the Professor's table of analysis may be here given :—

Composition of Lablab Beans.

	In 100 parts.		In 1lb	
	Husked. (3)	With husk. (4)	Oz.	Grs.
Water	12·1	12·1	1	410
Albuminoids	24·4	22·4	3	255
Starch	57·8	54·2	8	294
Oil	1·5	1·4	0	98
Fibre	1·2	6·5	1	17
Ash	3·0	3·4	0	238

From these figures the Professor concludes that the "nutrient ratio deduced from analysis (4), is 1 : 2·5, the nutrient value is 80. It will be seen, however, on comparing the several analyses given above, that the percentage of albuminoids is rather variable. The extreme range is probably not more than 6 per cent. Of the numerous forms of *Lablab* the majority are eaten as a green vegetable." The concluding sentence is of importance, since, to judge of the value of this plant as a source of human food, the green pods would have to be analysed.

FOOD and FODDER. Green Pods. 804 Ripe seeds. 805 Stems. 806

Food and Fodder.—The extensive series of quotations from numerous writers given above will, it is believed, have conveyed the main facts regarding the GREEN PODS as a vegetable, the RIPE SEEDS as a pulse eaten by certain classes or employed as cattle food, and of the STEMS as constituting a valued fodder. It is only necessary to repeat these points here in order to establish, in their proper places, the numbers to be assigned to these products.

MEDICINE. 807

Medicine.—The only record of this plant being used for medicinal purposes is that published above in the paragraph of cultivation in Assam.

DOMESTIC. Roots. 808

Domestic Uses.—The ROOT are said to be used in Assam to poison wild animals. This is a remarkable fact, since the whole plant has hitherto been supposed to be wholesome.

Dolichos sinensis, *Linn.*; see Vigna Catiang, *Endl.*; LEGUMINOSÆ.

D. uniflorus, *Lam.*; see Dolichos biflorus, *Linn.*

Dolomæa macrocephala, *DC.*; see Jurinea macrocephala, *Benth.*; COMPOSITÆ.

DOMESTIC AND SACRED.

809

have of necessity influenced him in dealing with the minor economic articles which, in the absence of a better title he has designated Domestic and Sacred Products.

DOREMA, *Don.; Gen. Pl, I, 918.*

Dorema Ammoniacum, *Don*; UMBELLIFERÆ.

RESIN. 810

The Eastern Giant Fennel (a native of Persia) is supposed to afford

ripen than the

No 472.

DORONICUM, *Linn.; Gen Pl., II, 440.*

Doronicum Falconeri, *Clarke; Fl. Br. Ind, III., 333;* COMPOSITÆ.

811

Habitat.—A stout herb 1-1½ feet high and nearly leafless above; found in Kashmir, altitude 13,000, and in Western Tibet 14,000 feet.

D. Hookeri, *Clarke; Fl. Br. Ind, III, 332.*

812

Syn—D. SCORPIOIDES, *Clarke, Compositæ Ind, 169 in part.*

Habitat.—A robust herb 1-2 feet high; found in Sikkim (Lachim and Tungu), altitude 12,000 to 14,000 feet.

[illegible]

[illegible]

[illegible]

Habitat.—A [illegible] found on the [illegible]

[illegible] the European plant D. [illegible]

Medicine.—[illegible] and [illegible] used [illegible] Dymock gives an [illegible] European drug D. [illegible] and states that [illegible] kept [illegible] in Bombay. It is described by the author of the [illegible] with [illegible] [illegible], and aromatic. [illegible] found in [illegible] of Syria, [illegible] about Mount [illegible] the name of [illegible] regard it as [illegible] of phlegm [illegible] useful in nervous depression [illegible] of the womb, and [illegible]

Dr. Dymock, from whom the facts given above have been compiled, [illegible] "[illegible] it is prescribed for persons who [illegible] and other venomous reptiles, and is hung [illegible] pregnant woman [illegible] which must be made by the [illegible] as a charm [illegible] the [illegible] and [illegible]" Dr. Dymock, under the heading Chemical [illegible] the [illegible] properties of [illegible] the [illegible] of the drug [illegible] It would appear from the [illegible] of signatures than [illegible] it is probable that [illegible] be substituted for the [illegible] imported [illegible]

DRACOCEPHALUM, [illegible]

[illegible]

[illegible]

Habitat.—[illegible] with [illegible] branches. Found in the [illegible]

Food and Fodder.—The plant is browsed by goats and sheep, and [illegible]

[illegible]

Habitat.—[illegible] herb found in the [illegible] temperate [illegible]

Medicine.—[illegible] says the [illegible] infusion."

[illegible]

D. [illegible]

Dracocephalum Royleanum, *Wall*, see Lallemantia Royleana, *Bth*, [LABIATÆ

819

DRACÆNA, *Linn.*; *Gen Pl*, *III*, 779.

the *bun amtol*, and D atropurpurea, *Roxb*, the *lall-bun amtol* Many Indian writers allude to the species of this genus, more especially the ornamental garden forms now so extensively grown Baker (Linnæan Soc. *Jour*, *XIV*, 525–538) describes 38 species met with in the world, of which ... es,

... ya, ... m,

Sylhet, Burma, &c

2.

3

4

Dragon's Blood 820

The only known economic product obtained from Dracæna is the DRAGON'S BLOOD said to be obtained from D. Draco, also from D. schizantha and D Cinnabari.

See Calamus Draco, Vol. II., Nos. 69–73, pp. 17 to 19.

DRACONTIUM, *Linn.*, *Gen Pl*, *III*, 995

821

Dracontium polyphyllum, *Linn.*; *Engler, in DC*, *Mon Phaner.*, *Vol*, *II*, *283*, AROIDEÆ.

H

The

mear

with

MEDICINE. Root. 822

Medicine —The ROOT is large ... possess antispasmodic virtues an ... used in hœmorrhoids Accordin ... Japan as a powerful emmenag ... abortion (*Ainslie*)

Special Opinion —§ "Good medicine for chronic diarrhœa" (*V. Ummegudien, Mettapollian, Madras*).

Dragon's Blood, see Calamus Draco and Dracæna above.

DREGEA, *Meyer*; *Gen Pl.*, *II.*, 775.

823

Dregea volubilis, *Benth*; *Wight, Ic*, *t* *586*; *Fl. Br. Ind*, *IV*, *46*; [ASCLEPIADEÆ

Syn —HOYA VIRIDIFLORA, *R. Br*, ASCLEPIAS VOLUBILIS, *Linn f*

Vern —*Nak-chhikni*, HIND, *Tit-kunga*, *tita-kunga*, BENG; *Marang kongat*, SANTAL, *Dodhi*, BOMB, *Hirandodi*, *harandori*, *khandodi*, MAR, *Kodic-palay*, *curinci kirai*, TAM, *Dudi-palla*, TEL, *Gway tankpin*, BURM; *Kiri anguna*, SING, *Madhu malati* (according to Ainslie), SANS

References.—*Roxb., Fl. Ind., Ed. C.B.C., 253; Thwaites, En. Ceylon Pl., [illegible]; Dalz. & Gibs., Bomb. Fl., 151; Campbell's Econ. Prod., Chutia Nagpur, No. [illegible]; Grah., Cat. Bomb. Pl., 119; Griff., Ic. Pl. Asiat., t. [illegible]; Pharm. Ind., 143; Ainslie, Mat. Ind., II., 154; O'Shaughnessy, Beng. Dispens., 451; Moodeen Sheriff, Supp. Pharm. Ind., [illegible]; Dymock, Mat. Med. W. Ind., 2nd Ed., 521; S. Arjun, Bomb. Drugs, [illegible]; Irvine, Mat. Med., Patna, 74; Lisboa, U. Pl. Bomb., [illegible]; Royle, Fib. Pl., [illegible]; Home Dept. Cor. regarding Pharm. of Ind., [illegible]; Indian Forester, III., 237.*

Habitat.—A stout, tall, climbing shrub of Bengal, Assam, the Deccan Peninsula, from the Concan southward to Ceylon.

FIBRE. 824 / Rope. 825

Fibre.—Contains an exceedingly strong FIBRE, which is extracted by the natives. The Rev. A. Campbell says that in Chutia Nagpur the Brahmans sometimes make their *poita* or sacred threads from this plant. Lisboa says that in Bombay the creeper is used as a substitute for ROPE to tie up bundles of firewood.

MEDICINE. Leaves. 826 / Roots. 827 / Stalks. 828

Medicine.—The LEAVES are much employed as an application to boils and abscesses. The ROOTS and tender STALKS are considered emetic and expectorant. Ainslie tells us that the *Vytians* suppose the root and tender stalks to possess virtues in dropsical cases; "they sicken, and excite expectoration; though I could not obtain much information of a certain nature respecting them, it is to be presumed that they operate in a manner somewhat similar to the root of Asclepias Curassavica; which, according to Browne, in his *Natural History of Jamaica*, the Negroes use as a vomit." The *Pharmacopœia of India*, after alluding to the value of the leaves as an external application, adds: "According to native testimony, it has the same emetic and expectorant virtues as Dæmia extensa." Irvine (*Mat. Med., Patna*) says this drug is used in colds and eye diseases to cause sneezing; dose gr. i to ½ drachm. Dr. Dymock repeats the above information, but adds that all parts of the

Follicles. 829 / Mealy Substance. 830

FOLLICLES are intensely bitter, and that the brown MEALY SUBSTANCE that covers them is given in Bombay to cattle as a medicine.

Juice. 831

Special Opinions.—§ "The tender end of the creeper with its JUICE when touched into the nose causes excessive sneezing. This remedy is commonly used by Hindus to make sick people sneeze" (*V. Ummegudien, Mettapollian, Madras*).

FOOD. Leaves. 832

Food.—Ainslie, while alluding to the report that the LEAVES are eaten as a green vegetable, doubts the accuracy of this opinion, because of their nauseate reputation. Many subsequent writers, however, affirm that they are regularly eaten. Thus Thwaites says, they are eaten in Ceylon, and Lisboa says of Bombay, the "leaves are used as a vegetable."

833

DREPANOCARPUS, *Mey.; Gen. Pl., I., 546.*

According to the *Genera Plantarum* there are only eight species belonging to this genus, and these are all American. The chief characters, as established by the *Genera Plantarum*, in the separation of this genus from Dalbergia, are the versatile anthers, and lunate to reniform pod. These characters, according to Kurz, are possessed by three Burmese trees, *viz.*, Drepanocarpus Cumingii, D. monospermus, D. reniformis, and D. spinosus. Following the usual course pursued in this work, however, of accepting the synonymy of the *Flora of British India*, these have been dealt with under Dalbergia, which see.

DRIMYCARPUS, *Hook. f.; Gen. Pl., I., 424.*

834

Drimycarpus racemosus, *Hook. f.; Fl. Br. Ind., II., 36;* ANACARDIACEÆ.

Drosera—Insectivorous herbs. (G Watt)

DROSERA peltata.

Syn —HOLIGARNA RACEMOSA, *Roxb*, *Fl Ind*, *II*, *82*
Vern —*Telsur*, BENG *Amdali*, ASSAM, *Amjour*, SYLHET, *Kagi*, NEPAL, *Brong kung*, LEPCHA *Chengane, sangaipru sangryn*, MAGH
References —*Kurz, For Fl Burm*, *I*, *314*, *Gamble, Man Timb*, *112*; *Cat Trees, Shrubs, &c*, *of Darjeeling*, *25*
Habitat —A large evergreen tree of the Eastern Himálaya, from 2,000

TIMBER. 835

50 feet long and 9 feet in girth are sometimes cut out of logs of this wood

DROSERA, *Linn*; *Gen Pl*, *I*, *662*.

There are three species of this genus of small annual insectivorous herbs found in India, of which Drosera Burmanni, *Vahl* (found throughout the

tata is a tall species with peltate leaves arranged along an erect stem It is

Drosera Burmanni, *Vahl.*; *Fl Br. Ind*, *II*, *424*, DROSERACEÆ

836

Vern —*Mukha jali*, HIND
References —*Stewart, Pb Pl*, *20*, *Kanara Gazetteer* (*XV*, *I*) *433*, *Indian Forester*, *II*, *24*; *VIII*, *405*, *Mason's Burma and Its People*, *436*, *749*, *Atkinson, Him Dist*, *310*, *735* *Drury, U Pl*, *118*
Habitat —Found throughout India, plentiful in the Gangetic plains,

D. peltata, *Sm*; *Fl Br. Ind.*, *II*, *424*.

837

Vern —*Chitra*, PB
References —See above.

Habitat —There are two forms of this plant, the type being found in Moulmein The form known as lunata occurs throughout the Himálaya and on the Nilgiri Hills It is nowhere, however, met with on the plains

Dye —Drury suggests that a dye may be prepared either from D Burmanni or D peltata, as Royle mentions the fact of the paper which con-

DYE. 838

MEDICINE Leaves. 839

FODDER. 840

Drugs, see Medicines.

DRYOBALANOPS, *Gærtn.; Gen. Pl., I., 191.*

841 **Dryobalanops Camphora**, *Coleb.*; DIPTEROCARPEÆ.

BARUS CAMPHOR.

See Vol. II., No. 259, pp. 84–93.

DUABANGA, *Ham.; Gen. Pl., I., 783.*

[LYTH

84 **Duabanga sonneratioides**, *Ham.; Fl. Br. Ind., II., 579;*

Syn.—LAGERSTRŒMIA GRANDIFLORA, *Roxb.*

Vern.—*Bandorhulla*, BENG.; *Baichua*, CHITTAGONG, SANTAL; *kokan*, ASSAM; *Bondorkella, achúng, bolchim*, GARO; *Jarúl-* CACHAR; *Lampatia*, NEPAL; *Dúr*, LEPCHA; *Baichua*, MAGH.; *gnau, myan kngo*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C.*, 404; *Kurz, For. Fl. Bu* 525; *Gamble, Man. Timb.*, 204; *Cat. Trees, Shrubs, &c., Darjeeli* *Indian Forester, I.*, 88, 99; *IV.*, 345; *VII.*, 101; *IX.*, 377; *XI.*, *XII.*, 286, 453.

Habitat.—A lofty, deciduous tree, with light-brown bark, peeling thin flakes; a native of Nepál and Eastern Bengal (ascending to feet), Assam, Chittagong, and Burma.

TIMBER. 843 — Tea-boxes. 844 — Cattle troughs. 845

Structure of the Wood.—Grey, often streaked with yellow, soft, s well, takes a good polish, and neither warps nor splits. Weight 3 cubic foot. Canoes cut out of it green are at once used, even when alternately to wet and the heat of the sun. In Northern Benga Assam it is now very extensively used for tea-boxes, for which purpo admirably fitted. It is also made into cattle troughs and other or domestic utensils. It came into use for tea-boxes in 1874-75 when wood became scarce. The seeds are small but germinate freely, s for planters this is one of the most useful of trees.

846 DUCKS, TEALS, GEESE, AND SWANS.

The large and very important assemblage of Indian birds which be accepted as represented by the Duck, the Goose, and the Swan, c tutes one of the best marked sections of the Order Natatores of Zool They are characterised by a more or less perfect state of web-foo having short, compressed tarsi and a flattened bill. In the Goose an Swan the bill is pointed, has a sharp nail-like hook on the tip, and as towards the base. In the Ducks and Teal the bill is nearly of one br throughout and quite flat, with well-developed lateral laminations, whic employed in sifting the water in the search for food.

The following are the chief edible birds of the above assemb met with in India:—

847 1. **Anas boscas**—The Mallard.

This is universally regarded as the best Indian Duck for the table, l followed in point of merit by the Pintail, and after that the Gadwall. Mallard is a, comparatively speaking, common species, though less s the western side of the continent.

848 2. **A. caryophyllacea.**—The Pink-headed Duck.

849 3. **A. pæcilorhyncha.**—The Indian spotted-bill Duck.

850 4. **Anser albifrons.**—The White-fronted or Laughing Goose.

Ducks, Teal, Geese, and Swans. (*G. Watt.*)

DUGONG oil.

5. A. cinereus.—The Grey Goose or Lag. 851
6. A. indicus.—The Barred-headed Goose. 852
7. Casarca rutila.—The Ruddy Sheldrake or Brahmani Duck. 853
8. Chaulelasmus strepera.—The Gadwall (see note above under No 1). 854
9. C angustirostris.—*The Marbled Teal.* 855
10. [illegible] 856
11. [illegible] 857
12. [illegible] 858
13. [illegible] 859
14. [illegible] 860
15. [illegible] 861
16. [illegible] 862
17. [illegible] 863
18. [illegible] 864
19. Mareca penelope.—The Wigeon. 865
20. Mergellus albellus.—The Smew. 866
21. Mergus castor.—The Gossander. 867
22. M. serrator.—The Red breasted Mergauser. 868
23. Querquedula circia.—The Garganey or Blue-winged Teal. 869
24. Q crecca.—The common Indian Teal. 870

This is universally eaten and one of the commonest birds offered for [illegible]

[illegible] 871 872 873

Though all of the above birds may be eaten, at most only three or four can be said to be regular articles of trade. Indeed, after the domesticated duck, the common teal is perhaps the most important. Their feathers are not articles of trade (see Feathers on a further page). 874

In the Gazetteers of India frequent reference occurs to the domesticated Duck and Goose and to the above wild species. The reader is referred to Hume and Marshall's *Game Birds of India* for the wild birds, and to the *Bombay Gazetteers* and other such publications for the domesticated especially: Vols II, 41; III, 19; IV., 29; V., 36; VI, 17; VII, 45; [illegible]

[illegible]

tion against the Duck.

Dugong oil, or the oil of the SEA HOG,—the YUNGAN or MOODA HOORA. 875

[illegible]

free from odour; when refined it is clear and limpid. It is largely used as a substitute for cod-liver oil (*Spons' Encyclop.*).

Dulcamara, see Solanum Dulcamara, *Linn.*; SOLANACEÆ.

Dunchi Fibre, see Sesbania aculeata, *Pers.*; LEGUMINOSÆ.

Durian, see Durio Zibethinus, *DC.*

DURIO, *Linn.*; *Gen. Pl., I.*, 213.

876

Durio Zibethinus, *DC.*; *Fl. Br. Ind., I.*, 351; MALVACEÆ.

DURIAN, OR CIVET-CAT FRUIT TREE.

Vern.—*Durian*, MALAY; *Duyin*, BURM.

References.—*Linschoten, Voyage to the East Indies in 1596, Vol. II., pp. 34, 51-53, 68; Burma Gazetteer, Vol. I., 429; Burma Gazetteer by Major Macneill, p. 230; Mason, Burma and Its People, 447 and 754; Annual Report of the Settlement of Port Blair for 1870-71, pp. 33-40; Kew Off. Guide to Bot. Gardens and Arboretum, 67.*

Habitat.—A large tree of the Malay Islands, wild in South Tenasserim, and cultivated as far north as Moulmein. The large flowered form, viewed by many botanists as the wild condition, is, by the *Flora of British India*, treated as a different species, under the name of D. malaccensis, *Planch.*

FOOD. Fruit. 877

Food.—Produces a large FRUIT, 10 inches by 7, called the *Durian*, or civet-cat fruit, of which the cream-coloured fleshy aril or pulp enveloping the seeds, like that of the Jack-fruit, is the part eaten. It is well known and much prized, but eaten by Natives only. It has a strong odour, considered by Europeans as highly offensive, which resembles that of putrid animal matter combined with rotten onions. The fruit is, however, highly prized, even by Europeans, when once the prejudice to the smell is overcome. The Burmans regard it as extremely luscious, and it forms a considerable part of their food. The roasted SEEDS and the boiled unripe fruit are also eaten as vegetables. John Huyghen van Linschoten's description of this fruit might be read as if written recently instead of 300 years ago. In his time it was perhaps as extensively cultivated as at the present. The Kings of Burma used to import large supplies of the fruit; indeed, it constituted a by no means unimportant article of traffic from Lower to Upper Burma.

Seeds. 878

Vegetable. 879

"The *Dorian* is regarded with peculiar favour by the natives and also European residents in the country. Colonel Biggs writes thus about it: 'It is so rich and highly flavoured, that it resembles marrow rather than fruit, and is subject when ripe to speedy decomposition, when its odour becomes disagreeable, a circumstance which has made it disliked by some who have not been able to eat the fruit fresh from the tree; it is beyond question the finest fruit in the world'" (*Burma Gazetteer, written by Major Macneill*).

DYERA, *Hook. f.*; *Linn. Soc. Jour., XIX.*

880

Dyera costulata, *Hook. f.*; *Fl. Br. Ind., III.*, 644; APOCYNACEÆ.

881

D. lasiflora, *Hook. f.*

Sir J. D. Hooker, in the *Linnæan Society's Journal, Vol. XIX., p. 293*, gives a brief history of these plants, while founding the new genus to which they are referred, a genus named in honour of Mr. W. T. Thiselton Dyer, C.M.G., Director of the Royal Botanic Gardens, Kew.

D. costulata was first collected by Griffith in Malacca, and has since been re-collected both in Malacca and in Sumatra. D. lasiflora seems confined to Singapore.

These interesting trees have been shown to be the source of the *Gutti-jelutong* of commerce See under Dichopsis—GUTTA-PERCHA.

GUTTA-PERCHA. 882

DYES AND TANS.

883

For a detailed account of the Dyes and Tans of India, see the Appendix to this work, also consult the Note under Domestic and Sacred Products above.

DYSOXYLUM, *Bl*, *Gen Pl*, *I*, *332*, *994*

[MELIACEÆ

Dysoxylum binectariferum, *Hook f*, *Fl Br Ind*, *I*, *546*,

884

Syn —D MACROCARPUM *Thwaites*, GUAREA BINECTARIFERA, *Roxb*, G GOTADHORA *Buch Ham*

Vern —*Rata* HIND *Borogatodhara*, ASSAM, *Rangirata*, CACHAR, *Katongsu*, LEPCHA, *Yerindi*, BOMB

References —*Roxb*, *Fl Ind*, *Ed C B C*, *319 Kurz*, *For Fl Burm*, *I*, *215*, *Beddome*, *Fl Sylv*, *t 150*, *Gamble Man Timb*, *71*, *Cat Trees*, *Shrubs*, *&c*, *Darjiling*, *16*; *Grah*, *Cat Bomb Pl*, *31*, *Lisboa*, *U Pl Bomb*, *42*, *Indian Forester IX 607*

Habitat —An evergreen tree of Sikkim (ascending to 2 000 feet), of Assam, the Khásia Hills, Chittagong and the Western Ghâts

Structure of the Wood —Reddish grey, rough, and close-grained, hard, weight 44lb a cubic foot This timber seems worthy of notice

TIMBER. 885

D. Hamiltonii, *Hern*, *Fl Br Ind*, *I*, *548*

886

Vern —*Bolashin* GARO, *Gendelli poma*, *bosuniya poma* (*Wall*), ASSAM, *Bauriphal*, NEPAL

References —*Gamble*, *Man Timb*, *72*, *Indian Forester*, *III*, *21*, *IV*, *292*; *VIII*, *29*

Habitat.—A large, evergeen tree of the Darjeeling Terai, Assam, and Sylhet

Structure of the Wood —Red, hard, close-grained, weight 40lb a cubic foot Used in Assam for boats and planks, said not to be durable Hamilton mentions that it is used for canoes

TIMBER. 887
Canoes. 888

D. procerum, *Hern*, *Fl Br. Ind*, *I*, *547*

889

Vern —*Dingori*, *govorpongyota* (*Wall*), ASSAM

References —*Kurz*, *For Fl Burm*, *I*, *214*; *Gamble*, *Man Timb*, *71*, *Indian Forester IV*, *292*

Habitat.—An evergreen tree of Assam, the Khásia Hills and Cachar to Pegu and Tenasserim, also met with in Sikkim and the Western Duars

Structure of the Wood —Bright red, moderately hard, handsome and well deserving of more extensive notice, weight 37 to 40lb a cubic foot.

It is said by Hamilton to be used for canoes

TIMBER. 890
Canoes. 891

E.

Eagle-wood, see Aquilaria Agallocha, *Roxb.*; Vol. I., p. 279.

Earthen-ware, Clays used for, see Vol. II., p. 364.

Earth-nut, see Arachis hypogæa, *Linn.*; Vol. I., p. 282.

Earths, see Soils.

Ebony, see Diospyros Ebenum, *Kœnig*; *III., p. 138.*

ECBALLIUM, *Rich.*; *Gen. Pl., I., 826.*

1 **Ecballium Elaterium**, *A. Rich.*; CUCURBITACEÆ.

THE SQUIRTING CUCUMBER.

MEDICINE. Fruit. 2

A native of South Europe. The FRUIT yields the Elaterium of commerce, which is a very powerful hydragogue cathartic. Dr. Dymock says that it does not appear to be known in Hindu medicine, but that the Arabs and Persians are well acquainted with it. The fruit is sold in Bombay under the name of *kāteri-indrāyan*, and is imported from Persia.

ECHINOCARPUS, *Blume*; *Gen. Pl., I., 239.*

3 **Echinocarpus dasycarpus**, *Bth.*; *Fl. Br. Ind., I., 400*; TILIACEÆ.

Vern.—*Gobria*, NEPAL.

References.—*Gamble, Man. Timb., 56; Ind. For., I., 95.*

Habitat.—A large tree of the Eastern Himálaya, from 5 to 7,000 feet.

TIMBER. 4 Tea-boxes.

Structure of the Wood.—Greyish-brown, soft; used for planking, for tea-boxes, and for making charcoal. It is in considerable demand in Darjiling (*Gamble*).

5 ECHIUM, *Linn.*; *Gen. Pl., II., 863.*

MEDICINE. Leaves. Flowers. 6

Echium sp.? BORAGINEÆ.

Under the above name Dr. Moodeen Sheriff, in *Supp. Pharm. Ind.*, 133, and Dr. Dymock, in his *Mat. Med. W. India, 2nd Ed.*, 571, have described the well-known bazar drugs *Gaozabán* and *Gul-i-gaozabán*. Considerable confusion exists in the literature of this subject, for not only is it probable that the products of entirely different plants are sold in the bazars as *gao-zabán*, but the correct botanical determination of the true *gao-zabán* is still doubtful. Moodeen Sheriff sent a specimen, so named, to Kew some years ago, and it was determined as a species of Echium. Stewart regarded the leaves of Onosma echioides as the *gao-zabán* of the Panjáb, and in this opinion he has been followed by Atkinson, Murray, &c. Royle, in his *Illustrations of the Himalayan Botany*, *p. 304*, says that, "Onosma bracteatum is called *gao-zabán*, or ox-tongue, and has *fúghulus* and *buglúsun* assigned as its Greek names." Sir W. O'Shaughnessy (*Beng. Disp., 420, 495*) regarded Cacalia Kleinia (COMPOSITÆ)—a synonym for Notonia grandiflora—as the true *gao-zabán* of the Indian physicians, and pronounced the drug obtained from Onosma bracteatum as useless. But he describes his Cacalia as prickly, which it is not, and thus leaves room for a grave doubt as to the accuracy of his determination. He specially mentions that the drug is prized in Bombay, while Dymock neither gives Notonia (Cacalia) grandiflora the name of *gao-zabán* nor attributes to it the properties of that drug. Birdwood wrote: "All Indian authorities refer *gao-zabán* to the above plant (C. Kleinia), but the *gao-zabán* of the bazars is also derived from Anisomeles malabarica, *R. Br.*, LABIATÆ; Trichodesma indicum, *Br.*, Heliotropium ophioglossum, *Stocks*, and Onosma bracteatum, *Wall.*, BORAGINEÆ." Lastly, Dr. Aitchison, in his report on

as *gao-zaban* On the whole therefore, it appears tolerably certain that the true *gao-zaban* of Indian bazars is derived from one or more species belonging to the Borage family See Onosma bracteatum. (For the above note on Echium the Editor is responsible, and regrets that it was omitted to be described under Caccinia glauca, which would appear to be the true source of the *gao-zaban*.)

ECLIPTA, *Linn*; *Gen. Pl*, *II*, *361*.

7

Habitat —An erect or prostrate weed, abundant throughout India,

DYE Herb. 8

in Bengal of anointing the heads of [illegible] with the juice of the fresh plant (Eclipta) to cause apparent [illegible] hair to become black. This is repeated once or twice, the hair being [illegible]." Dr. [illegible] does not regard it as having any virtue in permanently changing the colour of the hair. "Eclipta is here used for [illegible]. I have never seen Wedelia used." (*Dr W. Dymock, Bombay*) "[illegible], syn. erecta, is used on this side of India for preparing a [illegible] dye, not the other plant, which is called [illegible]." (*Assistant Surgeon Sakharam Arjun Ravat, L.M., Girgaum, Bombay.*)

E. 8

MEDICINE.

Medicine.—It is an old-established Hindu medicine, principally used as a tonic and deobstruent in hepatic and splenic enlargements, and in various chronic skin diseases; in the latter case, it is also pounded and applied externally. The YELLOW KIND, *peela bhangra*, described by the author of the *Makhzan-el-Adwiya*, is Wedelia calendulaceal; and, according to Dutt, is the kind mostly used in Bengal. Mr. Wood considers that the plant will be found eventually of greater service than Taraxacum in hepatic derangements. The expressed JUICE is recommended in the Pharmacopœia of India as the best form of administration. In Bombay, the natives use the juice in combination with aromatics, such as *ajowan* seeds, as a tonic and deobstruent, and give two drops of it with eight drops of honey to new-born children suffering from catarrh. It also forms an ingredient of a remedy used in the Concan for tetanus (*Dymock*). The FRESH PLANT, mixed with Sesamum oil, is applied externally in elephantiasis. Murray writes that in Sind the expressed juice of the ROOTS is employed as an emetic. It is also purgative. The Rev. A. Campbell states that in Chutia Nagpur the root is applied in conjunctivitis and galled necks in cattle.

Yellow kind. 9 · Juice. 10 · Fresh Plant. 11 · Roots. 12

SPECIAL OPINIONS.—§ "The juice of the LEAVES is given in one tea-spoon-ful doses in jaundice and fevers. The ROOT is given to relieve scalding of the urine in doses of 180 grains mixed with salt" (*C. T. Peters, M.B., Zandra, South Afghánistan*). "It is anodyne and absorbent, and relieves headache when applied with a little oil. It is an excellent substitute for Taraxacum" (*Kanni Lal De, Bahadur*).

Leaves. 13 · Root. 14

Eddoes, see Colocasia antiquorum, *Schott.*; Vol. II., p. 509.

EDGEWORTHIA, *Meissn.; Gen. Pl., III., 193.*

15

Edgeworthia Gardneri, *Meissn.; Fl. Br. Ind., V., 195;* THYMELÆACEÆ.

Vern.—*Kaghuti, aryili,* NEPAL.

References.—*Brandis, For. Fl., 386; Gamble, Man. Timb., 314.*

Habitat.—A large elegant bush, almost leafless when covered with its clusters of yellow sweet-scented flowers. Found along the Himálaya from Nepál to Sikkim and Bhután, between 4,000 and 9,000 feet altitude, and recently met with plentifully on the mountains of Manipur, extending to the northern frontier of Burma.

FIBRE. 16 · Twigs. 17 · Nepal Paper. 18

Fibre.—The strong, tough fibre obtained from the long, straight, sparsely-branched TWIGS of this bush must, sooner or later, become one of the most valuable of Indian fibres. The finest qualities of NEPÁL PAPER are made from this plant, which produces a whiter paper than that obtained from Daphne cannabina, *Wall.* The chemistry of Edgeworthia fibre, and the probable extent to which it is used in Nepál paper-making, will be found discussed under Daphne cannabina, *Wall.*; Vol. III., 20.

TIMBER. 19

Structure of the Wood.—Grey, light, soft, with little lustre (*Gamble*).

Edible Birds' nests, see Collocalia nidifica, Vol. II., p. 504.

Egg-plant, see Solanum Melongena, *Linn.*

EHRETIA, *Linn.; Gen. Pl., II., 840.*

20

Ehretia acuminata, *Br.; Fl. Br. Ind., IV., 141;* BORAGINEÆ.

Syn.—E. SERRATA, *Roxb.*

Vern.—*Púnyan, punjlawái, panden, koda, kurkuna, arjun,* HIND.; *Kula-aja,* BENG.; *Bual,* ASSAM; *Nalshuna, chillay,* NEPAL; *Puna, Punna, pursan,* N. W. INDIA; *Narra,* GARHWAL; *Shaursi,* KUMAON; *Ridi,* BAIGAS. *kalthaun, sum,* PB.; *Punra,* PUSHTU; *Rend,* KURKU;

The Ehretia. (J F Duthie)	EHRETIA lævis.

Habitat.—A medium-sized tree, found in the Sub-Himálayan tract ... Sikkim, ascending occa-

... which is eaten, the unripe

FOOD. Fruit. 21

Structure of the Wood.—Light brown, with white specks fairly even and compact, soft, not heavy, easily worked, made into scabbards, sword-hilts, gun-stocks, and employed in building and for agricultural implements. Not durable (*Brandis*)

TIMBER. 22

Ehretia buxifolia, *Roxb; Fl Br Ind, IV, 144*

23

Vern.—*Pála*, Hind, *Pale*, Dec, *Pala*, Bomb, *Kuruvingi*, Tam, *Bapana buri, pitta-pisiniki*, Tel, *Hin tambala*, Sing

References.—*Roxb, Fl Ind, Ed C B C, 201, Voigt, Hort Sub Cal,*

Habit...
also in the Malaya.

Medicine.—Ainslie describes the ROOT as sweet and slightly pungent when fresh. It is used as an alterative in syphilis. Muhammadans regard it as an antidote to vegetable poisons

MEDICINE. Root. 24

E. lævis, *Roxb; Fl Br. Ind, IV, 141; Wight, Ic, t 1382*

25

Vern.—*Chamrár, chamrur, koda, darar, datranga*, Hind; *Tambolli*, Beng, *Mosonea*, Uriya, *Datti, disti, gilchi*, Gond, *Tambol* (Banda), Bundel, *Chumbul*, Sind; *Tamboli*, Bomb, *Datrang*, Mar, *Pála dantam, pedda pulimera, seregad, siragadam, áddabukkudu*, Tel, *Kappura, avak*, Kan

References.—*Roxb, Fl Ind, Ed C B C, 201, Voigt, Hort Sub. Cal, 415; Brandis, For Fl, 340; Kurz, For Fl Burm, II, 210, Beddome,*

Habit...

Food.—The FRUIT is tasteless, but is eaten, as also the inner BARK, during famine times

FOOD. Fruit. 26 Bark. 27 FODDER. Leaves. 28 TIMBER. 29 VARIETIES. 30 31 32 33

mountains.

VARIETIES. 34

Var. aspera, *Syn.* E. aspera, *Roxb., Fl. Ind., Ed. C.B.C.,* 201; *Brandis, For. Fl.,* 340; *Beddome, For. Man.,* 166; *Kurz, For. Fl. Burm., II.,* 209. This variety appears to be confined to Eastern Bengal, and is distinguished by its small obtuse leaves, which are hairy beneath when mature.

35

Ehretia, obtusifolia *Hochst.; Fl. Br. Ind., IV.,* 142.

Vern.—*Chamror* (Panjáb Plains), *gin* (Rávi), *chamar* (Bias), *sakkur, dhaman, saggar, ganger, bari kan ler* (Salt Range), *chambal* (Sind Ságar Doáb), *marag'une, kharawune, khabarra, tutiri, lor,* PUSHTU.

References.—*Brandis, For. Fl.,* 340; *Gamble, Man. Timb.,* 272; *Stewart, Pb. Pl.,* 153 (E. aspera); *Dymock, Mat. Med. W. Ind., 2nd Ed.,* 576.

Habitat.—A small shrub, resembling E. lævis, *var.* aspera, and confined to Sind, Rájputána, and the Panjáb.

MEDICINE. Root. 36

Medicine.—A decoction of the fresh ROOT is used in venereal diseases (*Dymock*).

TIMBER. 37

Structure of the Wood.—Resembles that of E. lævis.

38

E. Wallichiana, *H.f. & T.T.; Fl. Br. Ind., IV.,* 143.

Vern.—*Bari, dowari,* NEPAL; *Kalet,* LEPCHA.

Reference.—*Gamble, Man. Timb.,* 272.

Habitat.—A large tree, frequent in Sikkim and Bhután, from 2,000 to 7,000 feet; also on the Khásia mountains.

TIMBER. 39

Structure of the Wood.—Grey and moderately hard; it is used for building and for charcoal, and occasionally for tea boxes (*Gamble*).

ELÆAGNUS, *Linn.; Gen. Pl., III.,* 204.

A genus containing about a dozen species, remarkable for the abundance of delicate silvery or brown scales with which the leaves and stems are coated. The tint of the foliage and the form of the fruit of some of the species give them a striking resemblance to the olive tree; hence the generic name.

40

Elæagnus hortensis, *M. Beib., Fl. Br. Ind., V.,* 201; ELÆAGNEÆ.

OLEASTER, BOHEMIAN OLIVE, JERUSALEM WILLOW, *Eng.;* OLIVIER DE BOHEME, *Fr.;* WILDE OELBAUME, *Germ.*

Syn.—E. ANGUSTIFOLIA, *Linn.,* and E. ORIENTALIS, *Linn.*

Vern.—*Sirshing, sirsing,* TIBET; *Shiúlik,* N.-W. P.; *Sanjit, santij, sanjata,* AFGH.; *Zin-zeid* (fruit), PERS.

References.—*Brandis, For. Fl.,* 389; *Irvine, Mat. Med., Patna,* 124; *Royle, Ill. Him. Bot.,* 323; *Balfour, Cyclop., I.,* 1035.

Habitat.—A small deciduous tree, bearing sweet-scented flowers, found on the Western Himálaya and in Tibet, up to 10,500 feet, and extending westward to Spain.

GUM. 41

Gum.—According to Stocks, a transparent brown and white gum, similar to Gum-arabic, exudes from wounds in the bark.

MEDICINE. Flowers. 42

Medicine.—The FLOWERS are reported to be medicinal.

FOOD. Berries. 43

Food.—The acid BERRIES are largely eaten in Tibet, Baluchistan, and Afghánistan, and the tree is cultivated to some extent for that purpose. The dried berries are known under the name of Trebizond dates, and are occasionally made into cakes by the Arabs. In Yarkand a spirit is distilled from these berries.

FODDER. Leaves. 44

Fodder.—Mr. J. H. Lace states that in the autumn in Baluchistan the LEAVES are given as fodder to sheep and goats.

TIMBER. 45

Structure of the Wood.—Sap-wood narrow; heart-wood dark brown, porous, soft; used for fuel.

DOMESTIC. Fuses. 46

Domestic Uses.—Dr. Stewart, in the manuscript copy of his *Forest Flora,* states that in Ladak the roots of this plant are used as fuses for match-locks.

47

... Wight, Ic., t. 1856. | 48

... (E. arborea, ... *haula*, KUMAON,

Hort. Sub. Cal., ... *Burm.*, *II*, 331; ... 17, *Thwaites*, *En.* ... *Bomb. Fl.*, 124, ... *on Prod.*, *N.-W.* ... *XV*, 441. ... andent, widely

India, and Ceylon.

FOOD. Fruit. 49

TIMBER. 50

E. umbellata, *Thunb.; Fl. Br. Ind.*, *V.*, *201.* 51

Syn.—E. PARVIFOLIA, *Wall.*

Vern.—*Ghwdin ghain, kankoli, kankol mirch, bammewa*, PB

References.—*Brandis, For. Fl.*, 391; *Gamble, Man. Timb.* 318; *Baden* ...

MEDICINE. Seeds. 52

Flowers. 53

Oil. 54

FOOD. Fruit. 55

TIMBER. 56

ELÆOCARPUS, *Linn.; Gen. Pl.*, *I.*, *239.* [66; TILIACEÆ.

Elæocarpus Ganitrus, *Roxb.; Fl. Br. Ind.*, *I.*, *400; Wight, Ic.*, *t.* 57

UTRASUM BEAD TREE, *Eng.*

Vern.—*Rudrak*, HIND.; *Rudrâkya*, BENG.; *Rudraksh*, MAR.; *Rudra-kai*, TAM.; *Rudra-challu*, TEL.; *Rudraksha*, SANS.

References.—*Roxb.*, *Fl. Ind.*, *Ed. C.B.C.*, 433; *Voigt*, *Hort. Sub. Cal.*, ...

DOMESTIC. 58

E. lanceæfolius, *Roxb.; Fl. Br. Ind.*, *I.*, *402; Wight, Ic.*, *t.* 65. | 59

Syn.—E. LANCEOLATUS, *Wall.*

Vern.—*Sakalang*, ASSAM; *Sufed-pai*, SYLHET; *Bhadras, batrachi*, NEPAL; *Skepkyew*, LEPCHA.

References.—*Roxb., Fl. Ind., Ed., C.B C., 435; Voigt, Hort. Sub. Cal., 123; Kurz, For. Fl. Burm., I., 169; Gamble, Man. Timb., 57.*

Habitat —A large tree of the Eastern Himálaya, from 6,000 to 8,000 feet; the Khásia Hills, Sylhet, and Tenasserim; also in Kánara.

FOOD. Fruit. 60

Food.—The FRUIT, which ripens in September and October, is eaten by the natives.

TIMBER. 61

Structure of the Wood.—Light brown and soft; it is used for house-building, tea-boxes, and charcoal.

DOMESTIC. 62

Domestic Uses.—The seeds of this tree are used for a similar purpose as those of E. Ganitrus. See Beads, Vol. I., p. 431.

63

Elæocarpus oblongus, *Gærtn.; Fl. Br. Ind., I., 403; Wight, Ic. t.46.*

Vern. —*Bikki*, NILGHIRIS.

References.—*Beddome, For. Man. 38; Gamble, Man. Timb., 57; Dalz. & Gibs., Bomb. Fl., 27.*

Habitat.—A large tree, found in Southern India, and in Burma.

TIMBER. 64

Structure of the Wood.—White, strong, and tough, and adapted for the lathe (*Beddome*).

65

E. robustus, *Roxb.; Fl. Br. Ind., I., 402; Wight, Ic., t. 64.*

Vern.—*Chekio*, MAGH; *Jalpai*, SYLHET; *Bepari, batrachi*, NEPAL; *Chekio*, MAGH.; *Taumagyee*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 434; Voigt, Hort. Sub. Cal., 123; Kurz, For. Fl. Burm., I., 169; Gamble, Man. Timb., 57.*

Habitat.—An evergreen tree of the Eastern Himálaya, ascending to 2,000 feet; the Khásia Hills, Eastern Bengal, Chittagong, Burma, and the Andaman Islands.

TIMBER. 66

Structure of the Wood.—White, shining, soft, even-grained.

67

E. serratus, *Linn.; Fl. Br. Ind., I., 401.*

Syn.—E. PIRINCARA, *Wall.*

Vern.—*Jalpai*, BENG.; *Perinkara*, KAN.; *Weralu*, SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 434; Voigt, Hort. Sub. Cal., 123; Brandis, For. Fl., 43; Beddome, For. Man., 38; Gamble, Man. Timb., 57; Thwaites, En. Ceylon Pl., 32; Trimen, Hort. Zeyl., 12; Buchanan, Statistics of Dinajpur, 153; Taylor, Topography of Dacca, 50.*

Habitat.—A tree found in the north-east regions of the Himâlaya, in Bengal, and on the western coast; also in Ceylon.

FOOD. Fruit. 68

Food.—The fleshy outer portion of the FRUIT is eaten in curries by the natives, and is also pickled in oil and salt like olives. In Assam the tree is occasionally grown for the sake of the fruit, which is eaten either ripe or unripe and boiled with vegetables to give them an acid flavour.

69

E. tuberculatus, *Roxb.; Fl. Br. Ind., I., 404; Wight, Ic., t. 62.*

Syn.—E. SERRULATUS, *Roxb.*

Vern.—*Rudrak*, HIND.; *Rudrák*, KAN.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 433; Beddome, Fl. Sylv., t. 113; Dalz. & Gibs., Bomb. Fl., 27; Lisboa, U. Pl. Bomb., 287; Balfour, Cyclop., I., 1037.*

Habitat.—A large handsome tree, found in South India, and in Burma.

DOMESTIC. 70

Domestic Use.—The nuts of this tree are used in the same way as those of E. Ganitrus. See Beads, Vol. I., p. 432.

71

E. Varunna, *Ham.; Fl., Br. Ind., I., 407.*

Vern.—*Tuttealv, saul-kuri*, ASSAM.

References.—*Kurz, For. Fl. Burm., I., 165; Gamble, Man. Timb., 57.*

Habitat —A tree met with in the Himálaya, from Kumaon to Sikkim; also in Assam and Chittagong

Food —Like the other species this also produces a FRUIT which is edible.

FOOD Fruit 72

ELÆODENDRON, *Jacq f, Gen Pl, I, 367*

Elæodendron glaucum, *Pers; Fl Br. Ind, I, 623;* CELASTRINEÆ — 73

Syn —E PANICULATUM, *W & A;* E ROXBURGHII, *W & A.,*

... 67; *Gamble, Man Timb, 67; Thwaites, En Ceylon Pl, 73 Dalz &* ...

Bomb Gaz, XV, 68

GUM 74

MEDICINE, Root 75, Bark 76

Leaves 77

tatory, and are used as a fumigatory to rouse women from hysterical fits A snuff of the leaves is also employed to relieve headache

Structure of the Wood —Moderately hard, even and close-grained, works and polishes well, light brown, often with a red tinge, the outer wood white, but no distinct sap-wood, no annual rings It is often beautifully curled and flaked It is used for cabinet work, combs, and picture frames It is also employed for fuel in the Konkans

TIMBER. 78

Elaterium, see Ecballium.

Elderflowers, see Sambucus nigra, *Linn.*

Elemi Gum. There is considerable doubt as to the plant or plants from which this substance is obtained It seems to be a member of the BURSERACEÆ It is generally supposed to be a species of ICICA, of AMYRIS, or of CANARIUM (It should not be confounded with *Animi,* for which see Copal) — 79

Elephant-apple, see Feronia elephantum, *Correa*, below.

ELEPHANTOPUS, *Linn.; Gen. Pl., II.*, 237.

80

Elephantopus scaber, *Linn.; Fl. Br. Ind., III.*, 242; *Wight, Ic.*, PRICKLY-LEAVED ELEPHANT'S FOOT, *Eng.* [*t. 1086*; COMPOSITÆ.

Vern.—*Gobhi, samdulun*, HIND.; *Gojidlata, shamdulun*, BENG.; *Manjurjuti*, SANTAL; *Hastipata*, BOMB.; *Anashovadi*, TAM.; *Eddu-málike-chettu* (bullock's tongue-shaped leaves), *hasti-kasaka, enuga-bira*, TEL.; *Ka-too-pin, ma-too-pin*, BURM.; *At-addeya, et-adi*, SING.; *Gojihbá, gojihwa*, SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 607; Voigt, Hort. Sub. Cal., 406; Dalz. & Gibs., Bomb. Fl., 122; Rheede, Hort. Mal., X., t. 7; Trimen, Hort. Zeyl., 44; U. C. Dutt, Mat. Med. Hind., 298; Dymock, Mat. Med. W. Ind., 423; Balfour, Cyclop., I., 1041; Treasury of Bot., I., 446.*

Habitat.—A stiff hairy herb, with wrinkled crenate radical leaves, distributed throughout the hotter parts of India.

MEDICINE. Root. 81 Leaves. 82

Medicine.—Rheede says that a decoction of the ROOT and LEAVES is given, on the Malabar coast, in cases of dysuria. In Travancore the natives are reported to boil the bruised leaves with rice, and give them internally for swellings or pains in the stomach. The Rev. A. Campbell states that in Chutia Nagpur, a preparation from the root is given for fever.

Elephant's-foot, see Elephantopus scaber, *Linn.*

ELEPHAS.

(*George Watt.*)

83

Elephas indicus, *Cuv.; Jerdon, Mam. Ind.*, 229.

THE INDIAN ELEPHANT: ELEPHANTES, *It.*; FIEL, *Scand.*; ELEPHANTE, *Sp.*; FIL, *Turkish*.

Vern.—*Hati* or *háthi, guj. pil*, HIND.; *Gaj*, BENG.; *Ani* or *anay*, TAM., TEL., KAN., and MAL.; *Yenu*, GOND; *Pil*, PUSHTU; *Hasti, gaja*, SANS.; *Feel*, PERS.; *Allia*, SING.; *Shanh, hsen*, BURM.; *Gadjah*, MALAYAN.

Mukna is a tuskless male elephant; tame females used in hunting are called *kúnkies*.

In the *Rig Veda* the elephant is mentioned once or twice under the name of *Migrohasti* (the beast with a hand), and in the *Atharvan* he is exalted as the mightiest and most magnificent of animals. But there is little in early Sanskrit literature to justify the inference that the elephant was then domesticated. The word Elephant is supposed by some to have been derived from *Pilu* in Sanskrit and *Fel* in Persian, which, with the Arabic article *El*, became *el-fil* and *Elephas* in Greek. The Hindu god of wisdom, Ganesh, has the body of a man with the head of an elephant.

References.—*Natural History of Indian Mammalia by Sterndale, 389; Thirteen Years among the Wild Beasts of India, by G. P. Sanderson, pp. 48 to 242; Through Masai Land by Joseph Thomson, 537; The Natural History of Ceylon, by Sir Emmerson Tennent; The Elephant, by Lieut. Ouchterlony; The Management of Elephants, by Col. Hawkes; Gilchrist—A Practical Treatise on the diseases of Elephants; Slymm, Treatise on the Treatment of Elephants in Health and Disease; Sanderson, The Elephant in Freedom and Captivity—a lecture in the Journal of the United Service Institute in India; Various papers in the Quarterly Journal of Veterinary Science in India; The Elephant, by J. H. Steel, V.S., A.V.D.; The Kuram Field Force, by G. A. Oliphant; Pack Gear of Elephants, by G. P. Sanderson; John Huyghen van Linschoten, Journal of Travels in India, published in 1596; The Ain-i-Akbari by Abul Fazl (Blochmann's Transl.), pp. 117 to 132, and 213, 214, 235, 284, 379, 467, and 618; C. P. Administration Report, 1865-66, p. 64, and 1866-67, p. 91; Bombay Gazetteers, Vols. VIII. (Kathiawar), 97; XII. (Khandesh), 29; XV., Pt. I. (Kánara), 27; Madras Man. Adm., Vol. II.*

WHERE FOUND. 84

Where Found.—Jerdon says: "The elephant is still tolerably common in most of the large forests of India, ... extreme south It is found in the ... the Kyarda Dún. It used, not m...

... e west coast, it is ... f Travancore to ... Western Ghâts, ... n ... s ... n

... Punnah in Bundelkhand were regarded as the best.

RACES. 85

(a) Ceylon.
(b) Indian.

Varieties and Races of Elephants.—According to most writers there is but one species of elephant met with in Asia Some authors, however, view the elephant of Ceylon as forming, with that of the Sumatra one, a distinct species (Elephas sumatranus). Jerdon says of this form "The Sumatran Elephant has 20 pairs of ribs" (the Indian has 19 and the African 21) "and the laminæ of the teeth are wider than in the Indian species It is said to be of a more slender make and to be more remarkable for its intellectual development than the Indian" A belief in the superior intellectual powers of the Ceylon as compared with the Indian elephant seems to have prevailed, at least for the past 300 years John Huyghen van Linschoten thus wrote of Ceylon: "It hath divers elephants, which are accounted for the best in all India, and it is by daylie experience found to be true, that the elephant of all other places and countries being brought before them, they honour and reverence these" Sanderson, ...

1. Nepal.
2. Mysore.
3. Bengal.
4. Chittagong.
5. Burma.
6. Shan.
7. Madras.
8. Bombay.
9. Central India.
10. Central Provinces.

... Mysore, just as the Mysore is different from that of Assam or of the Chittagong hill tracts. The Nepál elephant is reported to be small in

ELEPHAS indicus.

The Indian Elephant.

stature and well adapted for life on the hills. The Shán elephants are tall, massive, and handsome, but, like the Ceylon race, are very frequently tuskless. The Burmese elephant resembles more the Nepál animal in being, as Captain Hood remarks, "more compact than those of Hindústan and superior for hill work, carrying loads over steep places and across swamp, or boggy ground, and they are excellent for draught purposes." Steel remarks of the Chittagong race that they "are good all round and make the best *koonkies*; the Assamese are large, both tall and massive, and excellent for hunting purposes."

DOMESTICATED BREEDS. 86

Koomeriah. Dwasala. Meerga.

Speaking of the classification of elephants as adopted by the Natives of India from the standpoint of their appearance and utility, Sanderson says: "Elephants are divided by Natives into three castes or breeds, distinguished by their physical conformation: these are termed in Bengal *Koomeriah*, *Dwásála*, and *Meerga*, which terms may be considered to signify thoroughbred, half-bred, and third-class. The term *Koomeriah* signifies royal or princely. *Meerga* is probably a corruption of the Sanskrit *Mirga*, a deer; the light build and length of leg of this class of elephants suggesting the comparison *Dwásála* in Persian means two things or originals, and in reference to the elephant, signifies the blending of the first and third castes into the intermediate one. Only animals possessing extreme divergence, rank as *Koomeriahs* or *Meergas*: and the points of these breeds (if they may be so called) do not amount to permanent, or even hereditary, variations. Whole herds frequently consist of *Dwásálas*, but never of *Koomeriahs* or *Meergas* alone; these I have found occur respectively in the proportion of from 10 to 15 per cent. amongst ordinary elephants."

Not hereditary characteristics. 87

Sanderson enumerates the characters of the *Koomeriah* as follows, "barrel deep, and of great girth: legs short (especially the hind ones), and colossal, the front pair convex on the front side, from the development of muscles; back straight and flat but sloping from shoulder to tail, as an up-standing elephant must be high in front; head and chest massive; neck thick and short: trunk broad at the base and proportionately heavy throughout: bump between the eyes prominent: cheeks full: the eye full, bright and kindly: hind quarters square and plump: the skin rumpled, thick, inclining to folds at the root of the tail, and soft. If the face, base of trunk, and ears, be blocked with cream-coloured markings, the animal's value is enhanced thereby. The tail must be long, but not touching the ground, and well feathered."

A pronounced *Meerga* is the opposite of these characters, especially in possessing long legs and an arched back. It is well suited for quick marching on account of its lighter weight and length of legs.

AKBAR'S CLASSIFICATION. 88

1. Bhaddar. Pearl from Elephant. 89

2. Mand. 3. Mirg. 4. Mir.

The *Ain-i-Akbari* gives the classification of elephants as recognised in Akbar's time into four classes, *viz.*, (1) *Bhaddar*—"It is well proportioned, has an erect head, a broad chest, large ears, a long tail, and is bold and can bear fatigue. They take out of his forehead an excrescence resembling a large pearl, which they call in Hindi *Gaj manik* (Elephant's pearl); (2) *Mand*, a large black form said to have an ungovernable temper; (3) *Mirg*, a lighter coloured animal, and (4) *Mir*, an animal with small head which obeys readily but is easily frightened.

White Elephant. 90

The so-called white elephant, held sacred in Burma, is an albino condition. Steel says: "its very name has become a synonym for something expensive, useless, and extraordinary; yet we are assured that there is no such thing as a white elephant." Archibald Forbes gives, in his *Glimpses Through the Cannon Smoke*, a humorous account of the sacred white elephant of Burma. As a rule the pale-coloured form known as the white elephant is a sickly animal, his legs being swollen at the joints and often covered with tumours. The colour is at most a dirty grey, but the

skin underneath has often a pinkish colour, seen more especially when the animal goes into the water

CAPTURE OF WILD ELEPHANTS.

CAPTURE OF WILD ELEPHANTS 91

HERDS.—The elephant is a gregarious and polygamous animal, living in herds, the members of which are presumably all related to each other. Each male is specially attentive to a selected number of the females of the herd, but in the question of supremacy, the males often fight amongst

for solitude, choose to separate themselves from the herd for a time if not completely. A herd consists of from 10 to 50 or more. Herds of 1,000, such as are referred to in some of the older works, do not appear to be

Herds of 1,000. See p. 217.

Female leader. See p. 217.

often nobly cover the retreat of his cows." Sir Victor Brooke describes the herd from which he bagged the largest Indian tusks on record as

entertained any feeling but that of intense admiration and wonder. At length the great stream was, we believed, over, and we were commencing to arrange our mode of attack, when that hove in sight which called forth an ejaculation of astonishment from each one of us. Striding thoughtfully along in the rear of the herd, many of the members of which were, doubtless, his children, and his children's children, came a mighty bull,

ELEPHAS indicus.

The Indian Elephant.

METHODS OF CAPTURE.

the like of which neither my companion, after many years of jungle experience, nor the two Natives who were with us, had ever seen before. But it was not merely the stature of the noble beast which astonished us, for that, though great, could not be considered unrivalled. It was the sight of his enormous tusks, which projected like a long gleam of light into the grass through which he was slowly wending his way, that held us rivetted to the spot."

(a) Pits. 92
(b) Decoy. 93
(c) Kheddah. 94

METHODS OF CAPTURE.—Taking advantage of the fact that these noble animals thus live in herds and frequent definite paths in the forests, they are captured in various ways, *viz.*, by digging pits into which they fall, the mouths of which are covered over with a light frame-work of boughs and leaves: by driving them along one of their most frequented paths into an enclosure. The single elephants occasionally met with are also captured by means of tame females, the riders disguising and screening themselves as much as possible, and after having surrounded their prize, the attendants slip off the tame elephants and secure the feet of their victim.

Sanderson (*Thirteen Years among the Wild Beasts of India, p. 101*), gives a spirited account of his early attempts in capturing herds by driving them into an enclosure (the *Kheddah*). He writes of Mysore in 1873: "I knew nothing of elephant-catching at the time, nor had I any men at command who did; but I knew where there were plenty of elephants, and I was well acquainted with their habits. Some of the Maharajah's *mahouts*, who were amongst my following, had been accustomed to catch single elephants with trained females and in pitfalls, but they had never heard of any one attempting the capture of a whole herd. It was said that Hyder had made a trial, a century before, in the Kakankote jungles, but had failed, and had recorded his opinion that no one would ever succeed, and his curse upon any one that attempted to do so, on a stone still standing near the scene of his endeavours. Consequently, all the true Mussulmans who were with me regarded the enterprise as hopeless—though they judiciously kept that opinion to themselves." Mr. Sanderson then narrates the features of his system, which may be briefly described as the surrounding of a favourite resort of elephants by certain preliminary works prior to the arrival of the elephants, particularly the construction of a strong *kheddah* protected by a trench. When these preparations have been completed, the arrival of the elephants is awaited, but on their arrival some 300 men are rapidly assembled and the elephants, frightened by the noise made by these beaters, are at first made slowly, and later on with a rush, to advance into the *kheddah*. As soon as the last animal has entered, a man, screened from observation, cuts the rope by which the door of the trap is held, and this, closing by its own weight, the herd is captured. The beaters then surround the *kheddah*, and by drums, guns, and torches frighten any brave animal who may threaten an attack upon the enclosure. After vainly struggling for a time the frightened monsters of the forest crowd together in the centre and offer very little further attempts upon the stockaded trap. Food and water are supplied to them, and after all arrangements have been completed, and the animals have become in a measure accustomed to their captive state, tame female elephants, with one or two attendants, enter the *kheddah*. These singling out the largest victims separate them from the herd, two females, getting one on each side, hustle their prisoner towards a tree. The attendants slip off the tame elephants and secure its hind legs with strong ropes or chains with which they also attach it to the tree. Alarmed at this procedure, when efforts at freedom are now unavailing, it struggles violently, but in time submits. According to Mr. Sanderson the strongest and bravests animals become the most docile when thus convinced that they

METHODS OF CAPTURE

have been conquered. As soon as all have been secured, they are each in turn led out of the *kheddah* between tame elephants and picketed in a place [illegible] and through [illegible] ey get accus- [illegible] e attendants [illegible] by, they be [illegible] allow them- [illegible] successful is this treatment that the attendants after a few days are enabled to ride them and commence the process of training to a code of signals, gestures, and words They are then marched off to the Government stables, or are sold locally to traders.

SEASON OF 95

[illegible] closed the herd within a space of 6 or 8 miles in circumference Once thus surrounded the elephants can only escape through great carelessness [illegible]

[illegible] hundred years ago. In the *Ain-i-Akbari* (*Blochmann's Transl*, *284*) it is said of "Elephant hunts":—

"There are several modes of hunting elephants:

EARLY MODES OF HUNTING. Kheddah. 96

"1. *K'heddah*—The hunters are both on horse-back and on foot [illegible]

Char kheddah. 97

[illegible]

Gad. 98

[illegible] fall rapidly and noisily into the hole. They are then starved and kept [illegible]

Bar. 99

[illegible]

The Indian Elephant.

MODE OF HUNTING.

forget all cautiousness, and without fear they enter at the door. A fearless hunter, who has been lying concealed, then cuts the rope, and the door closes. The elephants start up, and in their fury try to break the door. They are all in commotion. The hunters then kindle fires and make much noise. The elephants run about till they get tired, and no strength is left in them. Tame females are then brought to the place, by whose means the wild elephants are caught. They soon get tame.

"From times of old, people have enjoyed elephant hunts by any of the above modes; His Majesty has invented a new manner which admits of remarkable *finesse*. In fact, all excellent modes of hunting are inventions of His Majesty. A wild herd of elephants is surrounded on three sides by drivers, one side alone being left open. At it several female elephants are stationed. From all sides male elephants will come to cover the females. The latter then go gradually into an enclosure, whither the males follow. They are now caught as shewn above."

Abul Fazl's description of the construction of an enclosure, the door of which is secured by the cutting of a rope, is practically that pursued by **Sanderson.** The fact that after being frightened for a time by the noises and fires of the men outside the enclosure, the animals, as if in despair, commence to eat the food provided for them, just as described also by **Sanderson**, shows how accurately the author of the *Ain-i-Akbari* had observed the Elephant-capturing operations pursued in Akbar's time.

Capture in Jahangir's presence.

Mr. Blochmann gives, as a footnote to the above, an account of a capture of elephants made in the presence of the Emperor Jahángír, which might be almost read as a scene from **Mr. Sanderson's** most detailed descriptions of his Kheddah operations. The passage is as follows:—"A large number of people had surrounded the whole jungle, outside of which, on a small empty space, a throne made of wood had been put on a tree as a seat for the Emperor (Jahángír), and on the neighbouring trees beams had been put, upon which the courtiers were to sit and enjoy the sight. About two hundred male elephants with strong nooses, and many females, were in readiness. Upon each elephant there sat two men of the Jhairyyah caste, who chiefly occupy themselves in this part of India (Gujrat) with elephant-hunting. The plan was to drive the wild elephants from all parts of the jungle near the place where the Emperor sat, so that he might enjoy the sight of this exciting scene. When the drivers closed up from all sides of the jungle, their ring unfortunately broke on account of the density and impenetrability of the wood, and the arrangements of the drivers partially failed. The wild elephants ran about as if mad; but twelve male and female elephants were caught before the eyes of the Emperor" (*Iqbálnámah, p. 113*). An earlier writer, **Linschoten** (frequently placed under quotation in this work), speaks of herds of a thousand elephants being surrounded, and a selection of a hundred or more made. **Linschoten's** account is historically of interest, since it shows that the Kheddah system was followed in Burma 300 years ago:—"They are found also, he says, in India, and in Bengala, and in Pegu great numbers, where they (use to) hunt them with great troupes of men, and tame elephantes, and so compasse, and get into a heape a thousand or two (at the least), whereof they choose out a hundreth or more as they néede, and let the other go, that the Countrey may alwaies have great store. Those they (doe) in time (bring up and) learne (them to travel) with (them and to indure) hunger and thirst, (with) other inventions, so long that they beginne to understand men when they speake. Then they annoint them with Oyle, and wash them, and so do them great good, whereby they become as tame and gentle as men so that they want nothing but speech" (*Linschoten, Vol. II., p. 1*). This remarkable

Capture in Burma.

MODE OF HUNTING.

observer in another passage alludes to the process of training, to the ... rs, and to ... His obser- ... tusk and ...

speaketh unto him: whereupon hee taketh the corde with his snout, ... outh, and ... If it be ... re of the ... d with his ... (pipe, or ... or vessel,) to see if it be fast or not (*Linschoten, Vol II, p. 9*) To any person who has seen the elephant piling great logs of timber at Moulmein, this feat of placing stones underneath the pipes of oil, &c., will not appear an overdrawn picture. The Moulmein elephants may be witnessed while at work to carefully examine if the logs lie straight and to tilt them this way or that way until parallel. In both cases, the intelligence may have proceeded, however, from the rider who, by almost imperceptible hints with his heels, knees, hands or words, commands the trained actions of the elephant But the illustration shows the high state of elephant training that existed in India during Linschoten's time (1596)

TRADE OR SUPPLY AND DEMAND IN ELEPHANTS.

TRADE. 100

Sanderson, while admitting that both the Ceylon and the African elephant may be viewed as threatened with extermination, is fully convinced ...

prohibited, and a vast reform effected by the substitution of the Kheddah ...

Extermination. 101

... The greatest enemy to the elephant ...

in India. 102

diminution in the numbers now obtainable; whilst in Southern India, elephants have become so numerous of late years that the rifle will have

ELEPHAS indicus.

The Indian Elephant.

to be again called into requisition to protect the ryots from their depredations, unless more systematic measures for their capture and utilization than are at present in vogue be maintained."

PRICES. 103

PRICES.—According to **Sanderson**, Kabul merchants are the chief traders in elephants, and the principal countries which meet the Indian demand are Ceylon, Burma, Siam, and a few of the forests of continental India. He adds "of late years [illegible] the number brought into the market [illegible] smaller than formerly, and prices are rising accordingly." He then gives a table of [illegible] from Ceylon from [illegible], the highest [illegible] in any one year being [illegible], but in the year [illegible], the imports [illegible] declined to only 3. The chief Indian mart where elephants are sold is the public [illegible] Sonepur on the Ganges [illegible] Patna, a mela being held some time in October or November. The Government of Bengal obtains its supplies from the Kheddah [illegible] at Dacca in Eastern Bengal. The average annual capture [illegible] is reported to be about 60, and Sanderson [illegible] the Government £50 to capture [illegible] the market [illegible] £75. In addition to the captures [illegible] Government, licenses are also issued for private traders [illegible] a certain class of [illegible] in payment of licence. The Madras Government [illegible] depend [illegible] on Burma for its supplies, since [illegible] in that Presidency. Elephants are, [illegible] the Mysore Government. Only recently, Mr. **Sanderson** [illegible] on behalf of that State, a herd of some 80 elephants. According to the published returns, Government possesses on an average about [illegible] elephants, and by present regulations, only females are [illegible] for the public service. This is owing to the risk attending [illegible]. It may, in conclusion, be stated that **Mr. Sanderson** has demonstrated that capturing elephants is actually remunerative to Government, [illegible] certainty of supply at a moderate [illegible]. It was found that in the open market a good serviceable elephant [illegible] at present Rs. [illegible], but year by year, with the extension of railway communication and the opening up of roads, the necessity for elephants is becoming less and less. They are of greatest use in regions where roads and easy communication is defective, and chiefly in carrying large [illegible] tents and other heavy baggage, that cannot conveniently be taken in smaller portions suitable for cattle and mules.

Catching stations. 104

Number captured. 105

DOMESTICATION.

DOMESTICATION. 106

In modern times the Indian Elephant has not been bred in captivity, but this, **Mr. Sanderson** explains, is a matter of economy and convenience, not of necessity. It is both easier and cheaper to capture full-grown animals than to be deprived of the usefulness of a female during a certain period of her pregnancy, and during also the subsequent three or four months, especially when considered in the light of the expense of rearing and training the young for a considerable number of years before they attain the age of maturity. During the Mogul Empire, however, elephants were regularly reared in captivity, and apparently some care was bestowed on the selection of breeds. In Burma, especially among the Karens, the female elephants are shackled and left at large in the jungles (during the non-working months), in order to ensure the attentions of wild males, and the young obtained by this semi-domesticated system are regularly reared. But, as **Sanderson** adds, "in Burma fodder is plentiful, and the young stock cost nothing till taken up for sale." In India generally fodder is so expensive, and the animals are at the same time so

DOMESTICATION.

overworked, that the offspring of domestication would be, in the 15 years necessary to rear them, both more expensive and less hardy than the captured wild stock In the *Ain i-Akbari* will be found much of great interest both as to the breeds of elephants, their classification, kind of work assigned to each, amount of food given, and the wages of attendants, &c The following extract with regard to breeding may be here given:—

Breeding.

"In former times, people did not breed elephants, and thought it unlucky, by the command of His Majesty, they now breed a very superior class of elephants, which has removed the old prejudice in the minds of men. A female elephant has generally one young one, but sometimes two For [illegible] th the milk of the mother [illegible] In this state they are c[illegible] ied *put*, when 20 years old, *bikka*, when 30 years old, *kalbin* In fact, the animal changes appearance every year, and then gets a new name When 60 years old, the elephant is full grown The skull then looks like two halves of a ball, whilst the ears look like winnowing fans" After the above there follows a careful description of the eyes, teeth, tusks, and trunk. "An elephant is perfect when it is eight *dast* high, nine *dast* long, and ten *dast* round the belly, and along the back" "Some elephants rut in winter, some in summer, some in the rains They are then very fierce, they pull down houses, throw down stone walls, and will lift up with their trunks a horse and its rider But elephants differ very much in the amount of fierceness and boldness" "When they are hot a blackish discharge [illegible]

much about the animal as we do at the present day Even the habits of the wild elephant were fully understood Space cannot be afforded for more than a very few other quotations from the *Ain-i-Akbari*, but the following will be of interest to naturalists:—'A herd of elephants is called in Hindi *sahu* They vary in numbers, sometimes a herd amounts to a thousand wild elephants are very cautious In winter and summer, they select a proper place, and break down a whole forest near their sleeping place for the sake of pleasure, or for food and drink, they often travel over [illegible]

Gestation.

red discharge, after which gestation commences During that period, they look startled, sprinkle themselves with water and earth, keep ears and tail upwards, and go rarely away from the male" The Emperor Jahángír (*Memoirs, p 130*), some time after the date of the *Ain i-Akbari*, while speaking of the period of gestation in elephants, says "During this month a female in my stables gave birth before my own eyes I had often expressed the wish to have the time of gestation by the female elephant correctly determined It is now certain that a female birth takes place after 16, and a male birth after 18 months, and the process is different from what it is with man, the fœtus being born with the feet foremost"

PECULIARITIES.

MUST. 111

animals: in some they last for a few weeks, in others for even four or five months "Elephants are not always violent or untractable under their ... roach of ... w of oily ... d, which ... so swell. ... not so ... trickles

"On the first indications the elephant is strongly secured. If he becomes dangerous his food is thrown to him and water supplied in a trough pushed within his reach" Sanderson continues: "The flow of

highly fed and lightly worked. "It has been supposed that male elephants as well as females 'come into heat,' and although they seem always prepared to pay attentions to females, there are certainly seasons when the sexual instinct in them runs higher than at others, and which may correctly be called 'rutting times'" The male approaches the

PACE 112

Cannot Jump. 113

remarkably well, the body being down in the water with the trunk carried erect for breathing. In fording shallow streams he moves cautiously, and may be trained to tramp down materials given him, to ensure a better footing. Should the ground sink underneath him he rolls over on his side to liberate his feet. It is thus recommended to send one elephant over a ford without his load in order to ascertain the nature of the shallow river bed before taking others with loads across.

LOADING. 114

LOADING.—The elephant equipment should be so constructed that the

ELEPHAS indicus.

The Indian Elephant.

PECULIARITIES.

weight of the load rests on the upper part of the ribs not on the spine. Half a ton is considered a good load for an elephant intended for continuous marching. Sanderson says: "I have known a large female carry a pile of thirty bags of rice, weighing 82lb each, or 1 ton and 2 cwts., from one store room to another, three hundred yards distant, several times in a morning. By the Bengal Commissariat Code elephants are expected to carry 1,640lb, exclusive of attendants and chains, for which 300lb extra may be added; but this is too great a weight for continued marching." Captain Hood gives the following estimate for loads:—elephants 7 feet 6 inches high not to exceed 6 maunds; 8 feet 7 maunds; 9 feet 8 maunds; and 10 feet 9 maunds. This is for hilly country, and for the plains he allows to each of the above animals 2 maunds extra. An excessive load tires the animal too soon, makes the feet sore, and causes it to stumble. An average load is, therefore, equal to that which would be carried by three camels or by seven and a half mules. On the march metalled roads are to be avoided, as these soon injure the feet and render the elephant useless. On this point Steel writes: "No part of the body is more liable to disorder, and complete temporary incapacity results from injury to or disease of these important organs." Although very sure-footed, an elephant picking his way through rocky dry beds of streams, a trench or precipitous nullah is almost impassable to him owing to his inability to jump. On ascending steep banks of streams, with a load, he is liable to fall on the back, and in such cases is almost invariably killed. He is not suited for draught purposes, but has often proved most useful in extricating guns from awkward positions; in such cases, however, he more frequently shoves than draws the load. It has already been remarked that the small Nepál elephant is more suited for hill work than the Assam or South India animal.

Load half a ton. 115

Not suitable for draught purposes. 116

SLEEPING. 117

SLEEPING.—The elephant requires very little sleep, but if disturbed in the few hours that are necessary he soon gets out of working form. There should be strict silence in the elephant camp after 9-30 P.M., and the sleeping ground, as Ouchterlony recommends, should, if possible, be on the incline, the animals being placed with the hind up hill. Unless this precaution be observed, should the animal lie down, he will most probably be unable to rise again without the aid of other two elephants. To raise him it has been recommended to give stimulants, then push him on one side and leave him to rest for a time, thereafter push him on to his legs. In rising the elephant "elevates the forehand first, and in lying he flexes the fore limb at the elbow and the hind limb at the stifle. The fore foot is bent inwards with the sole turned towards the root of the trunk, which organ lies curled upon the ground." (*Steel.*)

DETECTION OF AGE. 118

DETECTION OF AGE.—In detecting the age of elephants no difficulty is experienced with very old or very young animals; with intermediate ages, however, it is very difficult to say within a few years. Up to six or seven years the top of the ear is not turned over (as in man), but with advancing years it laps over,—in old elephants very much so, and with age, also, the margin of the ear gets torn. It is a common saying that no one has seen in the jungles the remains of a dead elephant, from which circumstance the natives believe he never dies. Sanderson and most sportsmen attach little importance to this circumstance, and affirm that it is no more to be wondered at than the rarity of finding the skeletons of other wild animals. The abundance of animals that greedily devour carcasses, when taken into consideration with the powerfully decomposing influences of the climate, are supposed to be sufficient causes for the fact of the rarity with which the bodies of wild animals are found in the forest.

Dead Elephants. 119

STATELY BEARING.—The elephant is peculiarly suited for the stately

PECULIARITIES.

processions, so much beloved by Native Princes His graceful motion and great size give him a charm which no other animal possesses To the sportsman he is of exceptional value, since his obedience and courage render it, comparatively speaking, safe to closely pursue the tiger and other large game, until so hard pressed that exposure to the rifle becomes a necessity The merit of the elephant as a baggage animal, in regions with defective communication, has already been dealt with, and there thus remains only the question of his utility or otherwise in warfare. In the *Ain-i-Akbari* will be found a description of the manner in which very courageous elephants were employed by Akbar on the actual battle field Large *howdahs* were constructed to carry a number of soldiers, who discharged their guns, spears, &c., on the elephant charging the enemy We read also that the African elephant was once upon a time domesticated, and that the Carthaginians employed them as fighting animals in their wars against Rome On the conquest of Carthage, the Romans for some time after also employed elephants, but more especially in the amphitheatre and in military pageants Thus during the ascendancy of the Roman Empire, elephants were quite common in Europe, but they ultimately disappeared and for centuries were altogether unknown and what is more remarkable, the African elephant, since the fall of Carthage, has not been again domesticated We read of the Indian elephants on the battle-field from the date of the wars against Alexander the Great down to modern times, but with the English army in India he is practically purely a baggage animal In concluding an instructive chapter on the adaptability of the elephant for certain work in modern warfare, Steel summarises his arguments as follows —

Baggage Animal. 120

Utility in ancient warfare. 121

Adaptability to modern warfare.

"I —The elephant, as an actual weight-bearer, is most valuable

"II —He is very difficult to feed, therefore but few can be allowed to the front on service

"III —But a few are very useful there to assist guns and other heavy draught over awkward places—whether sandy, muddy, or narrow

"IV —In siege trains, for slow draught movement of heavy guns, for carriage of scaling ladders, &c., &c, elephant legitimately finds a place.

"V —At the base, and along the [illegible] can easily fee [illegible] most useful r [illegible] tions of war [illegible] transport if re [illegible] vantageously [illegible] carts and waggons or traction engines when the roads are fit for draught

"VI —The spread of railways and metalled roads lessens the need for elephant transport, but in unopened jungly country the elephant is invaluable for Comm [illegible]

[illegible] the elephant proves most useful for shifting heavy guns, for moving heavy beams and other weighty articles, in throwing down walls, and in various other ways.

"VIII —Once the elephant acted the part of artillery in war—breaking up compact masses of Infantry at once by the weight of its charge and by the dread its appearance gave rise to It is now used at the front for artillery purposes only in carrying small guns, or in drawing those of Heavy Field Batteries.

ELEPHAS indicus.

The Indian Elephant.

DISEASES TO WHICH ELEPHANTS ARE SUBJECT, AND REMEDIAL AGENTS.

DISEASES. 122

WILD AND CAPTIVE ELEPHANTS.—Few travellers appear to have observed the wild elephant suffering from more than the natural infirmity of age. The young are always in good health. In captivity the diseases to which the animal is liable are probably all due to the sudden and complete change of life forced on him. It is often difficult to procure so large a quantity of grass as he requires, and the habit has thus to be learned of feeding on leaves of trees which, in the wild state, the animal rarely eats. In fact, with the exception of a few trees, the leaves and boughs of which are partaken of more as a relish than a regular article of diet, the elephant confines himself to eating grass. His habits are also methodical, and he rarely exposes himself to the scorching influence of the sun. At fixed intervals he drinks and bathes, at others feeds or reclines under deep and grateful shade, while his hours of sleep are equally a matter of rigid habit. All this is to a large extent disturbed by domestication. The mahout finds it easier to procure for his charge a meal of boughs of trees than of grass, and loving himself the midday heat, unless carefully watched, he will invariably start foraging late in the morning, most probably at the very hour he should be returning home with the day's supply. Sanderson says that there are two diseases to which the recently captured elephant is liable. These are the dropsical *yaarba'hd*—accumulations of water under the skin—and the wasting *yaarba'hd*, in which the animals fall gradually away to mere skin and bone. Freedom, he adds, from restraint, and liberty to graze as the animal likes, is the only cure for both these diseases. Medicine is of little or no avail.

Yaarba'hd. 123

Colds. 124

The elephant is extremely liable to cold, and extremes of climate or too rapid changes should be avoided. Thus, for example, when on the march the elephant should be allowed half an hour's rest to cool down before he is made to swim a river if the water be cold. If this precaution be not observed the animal is very apt to acquire the troublesome disease known as *chowrung*.

Chowrung. 125

BLOOD. 126

CLASSIFICATION OF DISEASES.—Steel classifies the diseases to which the elephant is subject into—NON-SPECIFIC DISORDERS OF THE BLOOD such as Debility, *e.g.*, *yaarba'hd* (*zaarbad*), fever, rheumatism, &c. SPECIFIC DISORDERS OF THE BLOOD, *e.g.*, Pleuropneumonia, doubtfully obtained from the epidemic out-breaks among cattle; Dysentery or Murrain; Anthrax; Rabies, from dog bites; Foot and Mouth disease (*kultá*), Variola Elephanti, or Elephant Small-pox.

DIGESTIVE. 127

But the elephant is also subject to many of the ordinary maladies which affect the DIGESTIVE SYSTEM, such as Simple Colic, Flatulent Colic, Enteritis, Diarrhœa, Dysentery, Parasites in the Alimentary Canal, Fascioliasis, and Hepatitis. Similarly, the RESPIRATORY ORGANS are frequently affected by the usual diseases to which man and animals are alike liable, such as Catarrh, Sore-throat, Inflammation of the lungs, and Bronchitis. Inflammation of the Kidneys, as Gilchrist pointed out, is also of fairly frequent occurrence, and amongst NERVOUS COMPLAINTS may be mentioned simple Phrensy after Anthrax, while Encephalitis or inflammation of the brain and its membrane often occurs, the animal becoming dangerous. Apoplexy, Tetanus, and Paralysis have been observed in certain cases.

RESPIRATORY. 128

URINARY. 129

NERVOUS. 130

SKIN. Ulcerations. 131

THE SKIN, though remarkably thick, is very sensitive, insects often annoying the animal very much, while SKIN DISEASES, Ulcerations, Boils, &c., are frequent and dangerous, the more so since a surface cure is only too frequently effected with serious later consequences. Sanderson remarks that SORE-BACKS from chafing of gear are exceedingly tedious

Sore-backs. 132

DISEASES.

to cure "A free use of the knife, great care in cleansing the wound, and

margosa (neem, Melia Azadiracta) oil should be tied over the wound to prevent flies approaching it and irritating the elephant" Oliver recommends that the wo[illegible]
syringe to pump the
turpentine will, he a
march SORE-FEET is

Sore-feet. 135

serious after the risk of injury to the back from imperfectly fitting gear A slipper to fit over the foot is by most authors recommended to be carried in case of need, and a preparation known as chôb is regarded as most useful in overwearing of the feet. This consists, among other ingredients, of Catechu 3lb, marking nut powder (Anacardium) 6 lb, Gum of Sal (Shorea robusta) 1½lb, Wax 2 lb, Jaggery 6lb; Gingili oil (Sesamum) 6lb, &c., made into a paste and applied over the surface of the foot. Steel, in concluding his admirable account of the diseases to which the elephant is subject, gives a list of the remedies in most general use He remarks that the doses may be said to be twice those given to the ox for corresponding maladies. The mahouts rarely prescribe purgatives, but according to Sanderson, the elephant eats earth for that purpose Emetics, as with the horse, have no action on the elephant In addition to the ordinary drugs in use for other animals, such as alum, chalk, sul-

Chob. 136

Doses of Medicines. 137

FOOD AND FODDER OF ELEPHANTS.

FOOD AND FODDER. Chief Causes of Disease. 138

Sanderson urges that if the elephant obtains a sufficient amount of

Rate of Mortality. 139

perform their work, and are laid open to attack by even such remote maladies as sunstroke and sore-back through poor condition. The elephant, in common with all wild animals, goes to no excess in any of its habits, and there is no reason, except bad feeding, why the rate of morta-

Habit. 140

and has a good deal to say to the
l to various diseases. "The amount of fodder," Sanderson says that should be given to an elephant, "is much

ELEPHAS indicus.

The Indian Elephant.

FOOD AND FODDER.

greater than is usually supposed. The Government allowance in Bengal and Madras for an elephant of full size is as follows :—

Weight of Fodder necessary. 141

BENGAL.

	℔
Green fodder—*viz.*, grasses, branches of trees, sugar-cane, &c. .	400
Or in lieu of the above, dry fodder, *viz.*, stalks of cut-grain .	200

MADRAS.

Green fodder	250
Or dry fodder	125

But the amount of suitable green fodder which a full-grown elephant will consume in eighteen hours I have found, by numerous experiments, to be much greater than this—*viz.*, between 600 and 700℔. This is what a beast of average appetite will actually *eat*, excluding what it throws aside; and I have seen a large tusker eat 800℔, or 57 stone, in eighteen hours." In another passage Sanderson adds, "since representing the inadequacy of the above allowances to Government in official correspondence on the subject, I have been informed that experiments have been made in the Bengal Commissariat Department in continuation of my own, which have proved that an elephant will eat 750℔ of dry sugar-cane, which is more feeding fodder than grass, per diem, and that steps are being taken to remodel the fodder scale." Steel writes: "No doubt grazing when possible is the best method of feeding, but sufficient range is not always procurable, and in the hot season grass runs short; even then, however, the branches of trees can be obtained and the leaves which constitute their hot weather foliage." Slymm wrote, "my opinion is that grass should form the principal kind of green fodder all the year round, and that either on the march, or when the good kinds are not obtainable, or as a kind of variation, its use may be substituted either by banian, jack tree, peepul, bamboo, plantain leaves, fresh paddy straw, or sugar-cane. The plantain leaves I would not recommend during cold or chilly weather." Forsyth says the elephant will not of choice feed on bamboo, though the young shoots are very acceptable and nutritious. When plenty good grass can be obtained as at the beginning of the rains, the *ratib* (or rations of food) may be reduced and increased when the fodder (*cherrai*) is scanty or of poor quality. The *ratib* consists (as prescribed in the Commissariat Code) of *atta* (coarse flour) or rice of the third quality or of dhán (unhusked rice) in twice the amount of either *atta* or husked rice. This grain is to be cooked by baking on an iron-plate and made into cakes or *chapatis* weighing about 2℔ each. Grain is also often made up with straw or leaves into small packages and placed in the elephant's mouth. He is fond of being thus fed and is a slow eater of grain otherwise, as he can only pick it up in small quantities. Much difference of opinion prevails as to whether the grain should be given cooked or uncooked. Salt and oil are also allowed to the elephant attendants, but the latter for external application only. According to the scale of rations 15℔ of grain a day is allowed to each elephant, 2 ounces of salt, and 1 ounce of oil.

Grass should be chief Fodder. 142

GRAIN. 143

Amount of per day. 144

Sanderson is opposed to giving elephants large allowances of grain, and would prefer a better quality and large quantity of fodder. He contends that the grain diet is unnatural. The wild elephant, however, regularly makes depredations on the fields, and, moreover, digs up roots and other farinaceous additions to his fodder diet. Tennent mentions, for example, the destruction of Sago-palms (**Caryota urens**) effected in Ceylon by the elephant. These palms are split open and their farinaceous pith greedily eaten. The chief difficulty appears to be in securing that the ration of grain is actually given to the elephant, since its allowance of fodder is lessened in consideration of its expensive diet of grain.

The following enumeration of the fodder plants specially mentioned by authors as given to the elephant has been obligingly furnished by Mr. J. F. Duthie :—

ELEPHANT FODDER.

Trees and Shrubs.

Acacia Catechu, *Willd.*; Vol. I., p. 27.
A. ferruginea, *DC*; Vol. I., p. 59.
A. lenticularis, *Ham.*; Vol. I., p. 52.
A. Suma, *Kurz*; Vol. I., p. 60.
The above Acacias are used as Elephant fodders in the Central Provinces

I., p. 330.

I., p. 555).

ccording to Mr. A. Smythies, Forest Department, Dehra).
Phœnix acaulis, *Roxb*; eaten in C. P.
Ricinus communis, *Linn.*
Shorea robusta, *Gaertn*; eaten by wild elephants in dry seasons in C. P.
Tamarindus indica, *Linn.* (in the Baroda State).
Typha elephantina, *Roxb.* (Elephant grass, one of the most extensively-used marshy plants).

Grasses.

Bambusa arundinacea, *Retz.* (See Vol. I., 391).
Dendrocalamus strictus, *Nees* (See Vol. III., 77).
Elionurus hirsutus, *Munro.* (*Fodder Grasses of N. India, p. 28*).
Saccharum spontaneum, *Linn.* (*Fodder Grasses of N. India, p. 25*).

the thick dark leaves of Messua ferrea; the leaves of the wood-apple,

FODDER.

devoured, and a cocoa-nut when found is first rolled under foot to detach it from the husk and fibre, and then raised in the trunk and crushed, almost without an effort, by its ponderous jaws." **Steel** writes: "Practically, most green stuffs, grasses, and leafy branches, are acceptable to the elephant and can be utilized by him as food—much must be left to his judgment in selection on the emergencies of the march, and when the Commissariat stores run short on a campaign."

(For further information see the article **FODDER.**)

ELEPHANT FLESH.

FOOD. 146

Elephant flesh is much relished by certain hill tribes as an article of diet, so that in addition to its utility as a baggage animal the elephant may be said to be of value as an article of human food. **Sanderson** narrates a remarkable accident where two tame elephants tied to a recently captured one were all three mysteriously drowned while swimming the Kumaloolie river of Chittagong hill tracts. Next day the Joomas swarmed in their boats over the place where the animals sank. The carcasses soon floated on the surface and were cut to pieces, and every particle of their flesh removed. Amongst the Hindus generally a singular belief prevails as to the medicinal property of elephant flesh boiled in mustard oil. This, probably from the theory of signatures, is viewed as a sovereign remedy for Barbados leg—the *daul-fil* of the Arabs (*Ainslie*).

MEDICINAL USES. 147

IVORY.

IVORY. 148

Reference has been made to the fact that the Ceylon elephant frequently has no tusks. In India a tuskless male is called a *mukna*. The tusks of the Asiatic species are considerably less than the African. The largest Indian tusk on record is that obtained by **Sir Victor Brooke.** The animal from which this was obtained had the left tusk diseased, but the right one measured (outside curve) 8 feet; length of part outside the socket or nasal bones, 5 feet 9 inches; greatest circumference 1 foot 4·0 inches; and weight 90 lb. **Sanderson** states that the largest tusks, of elephants shot by him, measured respectively 4 feet 11 inches and 5 feet in length outside curve: 16½ inches in circumference at the gum: weight 74 lb the pair. "As a rule tusks show barely one half of their total length outside the jaw of the living animal. The length within and without the nasal bones is generally exact, but the lip or gum hides a few inches of the projecting half. As the sockets or nasal bones of a large elephant are from 1 foot 6 inches to 1 foot 9 inches in length, this admits of an elephant's having a tusk 3½ feet long, of which 1¾ foot (the gum hides about 4 inches) is visible" (*Sanderson*). "Tusks if once lost are never renewed, and if, in cutting off the tips, too much be removed, thus endangering the hollow lower portion, the tusk is completely destroyed. One tusk is generally considerably longer than the other from the habit of the animal in using one more than the other. The Indian elephant is not hunted expressly for its ivory, and consequently the trade in Indian ivory is, comparatively speaking, limited. During the past five years the exports of Indian ivory have averaged in value from R44,635 to R73,315. India, however, imports a large quantity of African ivory, and does a considerable trade in exporting this foreign ivory to other countries. During the past five years the imports of foreign ivory have been valued at from R10,01,258 (the lowest annual valuation) to R31,24,851. The re-exports of this foreign ivory during that period have averaged from R4,46,164 to R18,24,672. The traffic in this foreign ivory is mainly concentrated in Bombay, the supply coming from Zanzibar and the East Coast of Africa. The exports of Indian ivory are almost exclusively from Bengal and Burma. The

TRADE IN INDIAN IVORY. 149

TRADE IN INDIAN IVORY.

Bombay.

It is said that Indian ivory has an opaque dead-white colour, and

the elephants but the larger the tusks. The finest *transparent* ivory is collected along the West Coast, between latitudes 10°N and 10°S

Annual slaughter to obtain Ivory. 150

sentative of the largest terrestrial animal.

ELETTARIA, *Maton; Gen Pl, III, 646*

[*f 267*, SCITAMINEÆ.

Elettaria Cardamomum, *Maton; Bentley & Trimen, Med Pl,* 151

The LESSER CARDAMOM, MALABAR CARDAMOM, *Eng;* CARDAMOME, *Fr;* CARDAMOMEN, *Germ*

Syn —ALPINIA CARDAMOMUM, *Roxb*

V

bahoola SANS; *Kakilahe-saghir*, and the following given by Moodeen Sheriff:—*Qaqilah qaqilahe sighar, hel, hel-bava, kh-air-bava, shoshmir,* ARAB; *Kakilahe-khurd* PERS

References —*Roxb, Fl Ind, Ed C B C, 24, Voigt, Hort Sub Cal, 568; Thwaites, En Ceylon Pl, 318, Dals & Gibs, Bomb Fl Supp, 85; Grah, Cat B m Pl, 206; Stewart Pb Pl, 238; Rheede, Hort*

The Lesser Cardamom.

Ind., 51; *Baden Powell, Pb. Pr.*, 300, 301; *Drury, U. Pl.*, 191; *Lisboa, U. Pl., Bomb.*, 176; *Spons', Encyclop.*, *II.*, 1803; *Balfour, Cyclop.*, *I.*, 1042; *Smith, Dic.*, 92; *Treasury of Bot*, *I.*, 446; *Kew Off. Guide to Bot. Gardens and Arboretum*, 62; *Ind. For.*, *X.*, 287; *Mys. & Coorg Gaz.*, *I.*, 124-125, *II.*, 411; *Ind. Agri.*, *IX.*, 43; *Mason, Burma and its People*, 496, 804; *Madras Manual, Vol. II.*, 135; *Nicholson, Man. Coimbatore Dist.*, 407; *Special Report by Collector, Madura; Rail-born Trade Report of Bombay*, 1881-82.

Habitat.—A large perennial herb, with a thick fleshy or woody rhizome, from the upper part of which are given off the horizontally spreading, flowering, and fruiting stems. It is indigenous in West and South India, growing abundantly in the rich moist forests of the hilly tracts of Kánara, Mysore, Coorg, Travancore, and Madura. **Mr. Ludlow** mentions it as "a native of the hilly parts of Cochin China, Travancore, Malabar, Coorg, Munjerabad, and Nugur. It is extensively cultivated in many other parts of South India, at elevations from 2,500 feet to 5,000 feet. It grows wild also in many parts of Burma, and in the Bhamo District is said to be cultivated in sufficient quantity for local consumption.

HISTORY. 152

HISTORIC NOTE.—*It is worth mentioning in this place that* **Linschoten**, in the Journal of his Indian Travels (*Published in 1596*), describes two forms of Cardamoms as used in South India. These he calls the Lesser and the Greater Cardamom. It would thus seem that 300 years ago, as at the present day, the Nepál Cardamom was carried all over India. Cardamom is in Sanskrit known as *Ela*, and is mentioned by **Susruta**, so that it must have been used by the Hindus from a very remote period. The early Arabian writers were acquainted with it, and the more recent Muhammadan authors speak of the Cardamom under the names of *Kakulah* and *Híl*. **Dr. Dymock**, referring to the first European knowledge of Cardamoms, says—"When they were first introduced into Europe is doubtful, as their identity with the Amomum and Cardamomum of the Greeks and Romans cannot be proved. **Garcia** thinks that the Amomum of the ancients was the *Hamáma* of the Arabs, a drug still to be found in the Bombay shops, and which appears to be a species of Sphagnum: it is figured by **Clusius**." **Muhammad Hussain** gives *kátídáús* as the Greek, and *sharfiyún* and *shusma* as the Syrian names for the Cardamom. He describes two forms—the large and the small. Of the Lesser Cardamom **Linschoten** wrote that "it most groweth in Calicut and Cananor, places on the coast of Malabar." Commenting on **Linschoten's** account of this spice, his contemporary, **Dr. Paludanus**, wrote that, according to **Avicenna**, there are two kinds of Cardamoms—the Greater and the Lesser. He then adds that to the ancient Greeks such as "**Galen, Dioscorides**, and others, it was unknown: and although **Galen**, in his *seventh book* of simples, saith that Cardamomum is not so hot as Nasturcium or watercresses, but pleasanter of savour and smell with some small bitternesse, yet those signes or properties doe not agree with the Cardamomum of India. **Dioscorides** in his first booke and fifth Chapter commending the Cardamomum brought out of Armenia and Bosphorus (although hee saith also that such doe growe in India and Arabia) saith that we must choose that which is full, and tough in breaking, sharp and bitter of taste, and the smell thereof causeth a heavinesse in a man's head: yet is the Indian Cardamomum caryed into these places from whence **Dioscorides** affirmeth that his Cardamomum doeth come although it be neither tough in breaking nor annoyeth the head, neyther is bitter of taste nor so sharp as cloves." Thus **Paludanus** held the opinion that has since become current in the literature of the subject that the Amomum and Cardamomum of the ancient Greeks was not the spice of India.

CULTIVATION.

CULTIVATION. 153

There are two ways of propagating this plant, viz., by bulbs (or rather rhizomes) and by seed. The chief requirements for successful cultivation are a rich loamy soil, and a site sheltered from strong winds and too

Planting.

The spaces between each plant may be 6 feet to 12 feet, according to the quality of the soil. The ground should be well cleared of weeds, stones, and rubbish, but when the plants have grown to a certain size no further weeding will be necessary, as nothing will grow under their shade. Seeds should be sown in prepared nurseries, care being taken not to sow

plants begin to flower, and five months later ripen some fruits, but a full

Coorg.

WYNAAD.

shade. The natives burn down the underwood, and clear away the small trees of the dense moist forests called sholas, which are damp all the year round. The cardamoms are then sown, and when a few inches high

ELETTARIA
Cardamomum.

The Lesser Cardamom.

CULTIVATION.

are planted out, either singly or in twos, under the shade of the large trees. They take five years before they bear fruit; 'in October,' remarks our informant, '*I saw the plants in full flower and also in fruit, the latter not however ripe.*' In North Cánara and Western Mysore the cardamom is cultivated in the betel-nut plantations. The plants, which are raised from seed, are planted between the palms, from which and from plantains, they derive a certain amount of shade. They are said to produce fruit in their third year; cardamoms begin to ripen in October, and the gathering continues during dry weather for two or three months. All the fruits on a scape do not become ripe at the same time, yet too generally the whole scape is gathered at once and dried, to the manifest detriment of the drug. This is done partly to save the fruit from being eaten by snakes, frogs, and squirrels, and partly to avoid the capsules splitting, which they do when quite mature. In some plantations, however, the cardamoms are gathered in a more reasonable fashion. As they are collected the fruits are carried to the houses, laid out for a few days on mats, then stripped from their scapes, and the drying completed by a gentle fire heat. In Coorg the fruit is stripped from the scape before drying, and the drying is sometimes effected wholly by sun heat. In the Native States of Cochin and Travancore cardamoms are a monopoly of the respective Governments. The Raja of the latter State requires that all the produce shall be sold to his officials, who forward it to the main depôt at Alapalli or Aleppi, a port in Travancore, where his commercial agent resides." "The cardamoms at Aleppi are sold by auction, and bought chiefly by Moplah merchants for transport to different parts of India, and also, through third parties, to England. All the lower qualities are consumed in India, and the finer alone shipped to Europe. In the forests belonging to the British Government cardamoms are mostly reckoned among the miscellaneous items of produce; but in Coorg, the cardamom forests are now let at a rental of £3,000 per annum under a lease which will expire in 1878. **Dr. Cleghorn**, late Conservator of Forests in the Madras Presidency, observes in a letter to one of us, that the rapid extension of coffee culture along the slopes of the Malabar Mountains has tended to lessen the production of cardamoms and has encroached considerably upon the area of their indigenous growth. A recent writer has shown from his own experience that the cultivation of the cardamom is a branch of industry worthy the attention of Europeans, and has given many valuable details for insuring successful results."

Cochin and Travancore.

MYSORE.
155

Mysore and Coorg.—Rice's *Gazetteer* (*I., 124*) gives the following description which will be found to amplify the facts narrated in the above passage:—

"Cardamoms are propagated entirely by cuttings of the root, and spread in clumps exactly like the plantain tree. In the month following the autumnal equinox, a cluster of from three to five stems, with the roots adhering, are separated from a bunch, and planted in the same row, one between every two areca nut palms, in the spot from whence a plantain tree has been removed. The ground around the cardamom is manured with *nelli* (Emblica) leaves. In the third year, about the autumnal equinox, it produces fruit. The capsules are gathered as they ripen, and are dried four days on a mat, which, during the day, is supported by four sticks, and exposed to the sun, but at night is taken into the house. They are then fit for sale. Whenever the whole fruit has been removed, the plants are raised, and, all the superfluous stems and roots having been separated, they are set again; but care is taken never to set a plant in the spot from whence it was raised, a change in this respect being considered as necessary. Next year these plants give no fruit, but in the year following, yield

capsules again as at first. After transplantation, the old stems die, and new ones spring from the roots Each cluster produces from a quarter to one seer weight of cardamoms"

CULTIVATION.

MADURA. 156

The Collector of the Madura District reports, in a recent communication, that the seeds are there sown from the beginning of July to the end of

December. The average crop in the first year of fruit is about 10lb. in the

COORG. 157

In course of time people noticed that it only grew in places where the *ground had been shaken by the fall of some large tree, or of a large* branch thrown down by the force of the wind, especially when this had happened a short time previous to the falling of the annual showers in

...uary hem, wood By more

influ- jun- them and their uary, pabi- rda-

TRAVANCORE. 158

ound ated shade , but

grows to a height

shoots which bear

early in the season,

the brushwood and

growth of the plants as soon as the rains fall They come back to gather the cardamoms when they ripen, about October or November." It is further said to be an uncertain crop, being greatly dependent on the rains In the *Madras Mail* there appeared the following particulars regarding cardamom cultivation in Travancore:—

of rainfall January. ther flou- e is con- in places, ie soil will be cleared

ELETTARIA
Cardamomum.

The Lesser Cardamom.

CULTIVATION.

of all undergrowth and the seed sown before the monsoon. In October, when the young cardamoms sprout up, it is necessary to thin them out where they are too much crowded and where the ground is sparely grown it should be sown with seed. For two years nothing more is to be done. In the third year the plantation should be weeded and the small crop gathered. In the fourth year the garden should be thoroughly weeded, and as it is, by this time, in full bearing, a close attention should be paid to it. "Cardamoms require light showery weather in March and April, when the flowering scapes are ready to blossom, and the absence of this at the proper time almost ruins the crop." Cardamoms ripen in November and are liable to be damaged by rats, snakes, and vermin of every description.

The scapes with the cardamoms are removed from plants; the capsules are then carefully removed from the scapes and dried on the rocks. The fruits soon lose their green colour and are then ready for the market.

The fruit sells at the coast at R4 per ℔ (Dutch), but the grower gets only a third of this.

A little care on the part of the Travancore authorities has brought up the total produce to 1,500 cwt., which was formerly only a few cwt.

"Roughly estimated, about 20,000 acres were under cultivation, and there is land available for extending the cultivation five-fold.

The yield per acre in even favourable time does not exceed 20 to 25℔ of cardamoms."

BOMBAY.
159

Bombay.—The following special report has been furnished, for the present work, by the Officiating Director of Land Records and Agriculture:—

Cardamoms are grown in Kánara only. In 1887-88 that crop occupied 899 acres. It is common in the hill gardens of North Kánara. It requires plenty water. In a new garden, Cardamoms are grown from seed, and in an old one from cuttings. The seed is sown in October after the outer shell is removed. It must be carefully sheltered from the sun, and it takes three months to sprout. When the seedlings are a foot high, they are transplanted, and a year and a half later they are set in shady places among betel-palms, and begin to bear when three years old. In Sirsi about 1,000 seedlings go to an acre, while in Yellapur the number of seedlings required to plant an acre of land is 650. The pods commence ripening in September and October, and are gathered till the end of February or the beginning of March. There are about 17 pickings, more than half the pickings having an interval of a week between them, while the rest from a fortnight to three weeks. The acre yield varies from 7 to 28℔. The pods, after they are dug out of the ground, are dried four days on a mat, which, during the day, is hung in the sun, and at night is taken into the house. The pods are then fit for sale. When the whole crop has been picked, the plant is taken out of the ground, the useless wood and roots are cleared away, and it is again planted in a fresh hole. The year after it has been moved, the plant yields no fruit, but in the following year it again bears. After the plant has been removed, the old stem dies and a new stem springs from the root.

Cost of cultivation; yield, &c.

As Cardamom is never grown by itself it is very difficult to ascertain accurately the cost of cultivation. As a rule, it is grown in spice gardens containing betel-nut palms, betel and pepper vines, and plantains. In an experiment conducted in a good specimen of the highest class of spice garden in full bearing, Mr. J. H. Todd, C.S., estimated the cost of cultivation per acre at R90. To this must be added R45, being a moiety of wages for watching, weeding, and taking care of the garden. Thus the amount of charges per acre comes to R135. By the same experiment the value of produce—114℔—comes to R326. Mr. Todd's details of the

cost of cultivation and profit are more reliable than those given in the *Kánara Gazetteer*

CU[illegible] T[illegible]

Blea[illegible]

Bleaching of Cardamoms —Though local taste appears to prefer them unbleached, a good market is found for doctored Cardamoms as far as Bombay and Bangalore, and for this purpose a considerable proportion of the Cardamoms produced in Kánara is taken to Haveri and Dharwar to be bleached with the aid of the water of the well which is supposed to have the virtues of bleaching and improving the flavour of Cardamoms The well belongs to a Jangam or Ling-ayat priest He makes no charge for its use, though it is said that he receives occasional voluntary presents from the Cardamom dealers

With a view to ascertain whether this well had really the virtues ascribed to it, samples of its water were subjected to analysis by Dr Lyon, Chemical Analyser to Government, and Dr Cooke Principal, College of Science, Poona Both think that the so-called virtues of the water are totally fanciful The Chemical Analyser reported —"I have examined a sample of water stated to be a specimen of that used at Haveri for washing Cardamoms The sample yielded to analysis the results shown below I was unable to detect in the water the presence of any special constituents such as would account for the reputation stated to be possessed by it of being a water specially suited for washing Cardamoms —

ANALYSIS.

	Grains per gallon
Total solids by evaporation	427 00
Chlorine	110 60
Sulphuric acid	36 38
Silica	2 59
Alumina	4 27
Lime	60 20
Magnesia	34 44
	675 48"

Mr. E O Ozanne, C S, who in 1885 saw the whole process of bleaching describes it as follows —"Water from the well is drawn and taken to a suitable room A large earthen-ware vessel is filled with the water into which pounded *antalkai* (the fruit of the soap-nut, *Sapindus trifoliatus*) and *sikikai* (Acacia concinna), in the proportion of 2lb of the former to ½lb of the latter for about 5 gallons of the water, are placed and well stirred Another vessel contains a strong solution of common soap in the water of the well The mixture containing 2lb of pounded soapnut and ½lb of *sikikai*, supplies for 5 *mans* (1 man = [illegible]) of cardamoms.

"Two women seated on tripods place a [illegible] vessel between them—the washing tub [illegible]. [illegible] *lota-fulls* of the well water (a large supply of which [illegible]) are poured into the tub, and three *lota-fulls* of the [illegible]. The *lota* holds about one quart of water

"The tub then receives a basketful of [illegible]. The two women plunge their hands [illegible] about one minute and then [illegible] time, and again stir for another [illegible] completes the first washing [illegible] transferred, to a basket [illegible] drained off. The basket [illegible] tripods with a washing [illegible] the pure water, [illegible] the soap solution. [illegible] the same interval of [illegible]

ELETTARIA Cardamomum.

The Lesser Cardamom.

CULTIVATION.

water is drained off, the washed cardamoms are thrown on to a mat. The heap becomes large after a few hours' work. A woman is exclusively in charge of it and continually sprinkles the well-water over it. She is relieved at night by another woman, who sprinkles the heap till morning, once every half hour.

Bleaching.

"Next day when the sun has risen, the heap is carried to the flat roof of the house, and the cardamoms are spread on mats for four or five hours to dry. The next operation is to nip off the short stalks. This is done by women sitting in the house. Each woman has a large pair of English scissors. She squats on the floor and rests her right hand which holds the scissors on the floor, and feeds the scissors with her left hand. The pace at which this nipping is done astonished me. The stalk is very small and care must be taken to cut it off without injury to the cardamom itself. I saw an old woman nip 90 cardamoms in one minute.

"This done, the sorting begins. The small ill-shapen cardamoms are separated, and only the well-rounded ones packed for export to distant markets. A woman sorts a *man* per diem.

"I must now return to the first washing. The mixture in the tub, after the first basketful has been baled out, is replenished by two or three quarts of the well-water and a second basketful washed. The tub is then emptied and a fresh mixture made. The mixture for the second washing also does duty for two basketfuls. The women who wash the cardamoms are paid 3 annas per diem. An ordinary wage is 1½ to 2 annas. The night-watcher receives 4 annas. The nipping is paid for by the piece at the rate of ½ anna per *padi* (10 padis = 1 *man* = 26lb). It is said that an expert can earn 2½ annas per diem. She must clip 13lb therefore; all other hands employed are paid by the day at 2 annas."

Starching.

"Besides this bleaching now-a-days cardamoms are starched. Starching was first introduced at Sirsi, where bleachers had recourse to it as they had to compete with the bleachers at Haveri, who were experts in the art of bleaching, and who had established their fame as such. The starched cardamoms look whiter than the ordinary bleached cardamoms of Haveri; and the bleachers of Haveri have therefore now taken to starching. The starch is prepared by pounding together rice, wheat, and country soap with butter milk. The paste is dissolved in a sufficient quantity of water, and the solution is sprinkled over the cardamoms to be starched as they are being rubbed by the hand."

It may be worth adding in connection with North Kánara, that Mr. Talbot, in his interesting paper on the trees and shrubs of that district, makes no mention of the wild cardamom, from which circumstance it may be inferred as not indigenous. In the *Bombay Gazetteers* brief notices are given regarding the cardamom. Of Khandesh it is said to be grown in sufficient quantity to meet local demand, but that there is no export. It is also mentioned as one of the thirteen spices which are grown in Kolhapur.

AREA OF CULTIVATION, PRICES, &c.

AREA. 160

The total area under cardamoms cannot be definitely determined, though it may be affirmed that the crop is chiefly raised in the portion of the mountainous tract of the southern or south-western extremity of India. The chief districts in the Madras Presidency and the areas under the crop during the past three years were Madura (1885-86, 1,200 acres; 1886-87, 1,000 acres, and 1887-88, 1,800 acres); South Canara (1885-86, 1,000 acres, 1886-87, 1,800 acres, and 1887-88, 1,400 acres); and Malabar (1885-86, 1,500 acres, 1886-87, 1,800 acres, and 1887-88, 2,000 acres). In Mysore, cardamoms are mainly grown in the Kadur District, the area under the crop having, in the corresponding years to the above, been 1,600, 2,300, and

CULTIVATION.

Area.

2,200 acres. In Coorg the crop rarely occupies much over 300 acres. Thus, in Southern India, according to the published statistics, there were 7,700 acres in 1887-88 and 5,590 acres in 1885-86. According to these returns the area under cardamoms has increased, while it will be found the foreign exports have decreased, but the imports greatly increased. There are many other features of the cardamom trade which appear contradictory, so that in compiling from existing literature, it is difficult to decide the course to be pursued. It is hoped, therefore, that this admission may

PRICES. 161

there is scarcely ever any stock on hand, you will understand that purchases are made from immediate shipment—

	Mds.
	1,100
1867	708
866	983
865	1,884
864	1,882

Plants and Ferns of Ceylon,

Cardamomum, Maton, var.

statement made above that

is Amomum subulatum

Elettaria Cardamomum, two widely different plants

TRADE. 162

TRADE.

The trade in Indian cardamoms seems to have been declining for

alued

cord

5-86,

dom

last

ving

TRADE.

countries are generally in the following order of importance:—Arabia, Germany, Aden, and Persia. On the other hand, the *imports* of Foreign Cardamoms seem to be on the ascendant. In 1880-81 they were valued at R4,134, and taking the same years as have been given for the exports, these imports were in 1883-84, R18,351; 1885-86, R92,205; and 1887-88, R2,60,450. During the last mentioned year the bulk of the imports (*viz.*, R2,51,211 worth) came from Ceylon, and of the total of these foreign imports, Bombay received R2,16,455 worth. The coast-wise imports and exports (*e.g.*, the inter-provincial trade by sea) were valued at over 10 lakhs of rupees, so that, excluding the trans-frontier trade by land and the railway, road, and river-borne transactions (the exact figures for which cannot be discovered), the total Indian trade in cardamoms was last year valued at R25,11,053. But it must be added that it is not known how much of these figures of Indian trade in cardamoms relate to the Greater or Nepál Cardamom (see Amomum subulatum), though, of course, the bulk of the transactions, especially in South India and Ceylon, must be in the Lesser Cardamom, the fruits of the plant presently under consideration.

OIL. 163

Oil.—An essential OIL is extracted by aqueous distillation. It is of a pale yellow colour, about 5 per cent. being generally obtained; it possesses the flavour and odour of Cardamoms, and is said to be distilled to some extent in Madras.

MEDICINE. Seeds. 164

Medicine.—The SEEDS are agreeably aromatic, but their chief medicinal use is as an ingredient in compound preparations. "They are used as a corrective for foul breath. Finely powdered they are administered as a snuff for headache. The cardamoms, fried and mixed with mastiche and milk, are employed internally in irritation of the bladder. In nausea and vomiting they are used as a *sherbut* with pomegranate, and in cholera they are resorted to as a stimulant" (*Dr. Emerson*). As the seeds rapidly deteriorate on exposure, they should not be removed from the capsules until required for use.

SPECIAL OPINION.—§ "*Carminative, employed with other aromatic drugs.*" (*Assistant Surgeon Shib Chandra Bhuttacharji, Chanda, Central Provinces*).

FOOD. 165

Food.—Cardamoms are used by the natives in flavouring sweetmeats and certain cooked dishes; also as a spice, and are sometimes chewed in *pán* with betel-leaf.

ELEUSINE, *Gærtn.; Gen. Pl., 1172.* [GRAMINEÆ.

(J. F. Duthie.)

166

Eleusine ægyptiaca, *Pers.; Duthie, Fodder Grasses, N. Ind., 56;*

Syn.—CYNOSURUS ÆGYPTIACUS, *Linn.*; DACTYLOCTENIUM ÆGYPTIACUM, *Willd.*

Vern.—*Makra, makri,* HIND.; *Kákuriya,* URIYA; *Suntu-bukrui,* SANTAL; *Cavara-pullu,* MAL (S.P.); *Maka-makna, tipakia,* BUNDEL.; *Madana, chimbari, chubrei, bhobra, madhána, kar-madhana,* PB.; *Malicha, maligha, mansa,* RAJ.; *Mathna, chikára, chota mandiya, ute-sirkum, ute-sirla,* C. P.; *Mhar, nachani, natchni, nagli, raj,* BOMB.; *Tamida, sodee,* TAM.; *Muttengapilloo,* TEL.; *Puta-tana,* SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 116; Voigt., Hort. Sub. Cal., 712; Thwaites, En. Ceylon Pl., 371; Stewart, Pb. Pl., 254; Aitchison, Cat. Pb. and Sind Pl., 167; Trimen, Hort. Zeyl., 110; Rheede, Hort. Mal., XII., 131, t. 69; Lisboa, U. Pl. Bomb., 208; Royle, Ill. Him. Bot., 421.*

Habitat.—A perennial grass with stems erect, or creeping and rooting at the nodes. It is plentiful all over Northern India, especially on cultivated ground.

MEDICINE. Seeds. 167

Medicine.—A decoction of the SEEDS is renowned in Africa as an

alleviator of pains in the region of the kidney, and its herbaceous parts are applied externally for the cure of ulcers (*Le Maout and Decaisne, Descriptive and Analytical Botany, Eng Trans, 891*)

MEDICINE.

Food.—The SEEDS are eaten by the poorer classes, especially during times of scarcity.

FOOD. Seeds. 168

Fodder.—It is generally considered to be a very nutritious fodder grass for cattle, being both fattening and milk-producing.

FODDER. 169

Eleusine Coracana, *Gærtn.; Duthie, Fodder Grasses, N Ind, 57*

170

Syn.—CYNOSURUS CORACANUS, *Linn.*

Vern.—[illegible]

References.—[illegible] *Hort Sub Cal, Bomb Fl, 57, Pl, 168 DC, Trimen, Hort 193, Duthie &* [illegible]

[illegible] *Hunter, Orissa, II, App. IV., 133; Set. Rep, Bareilly, 1874, 68, U C Dutt, 268, 314*

Habitat —A tall annual grass; stems many, erect or decumbent at the base, and somewhat compressed At the summit of each stem are four to six digitate, and usually incurved spikes. It is largely cultivated as a rainy-season crop, and in many parts of India its grain constitutes the staple food of the poorer classes It is affirmed that the grain is never attacked by insects, and will accordingly keep for any length of time

History.—The facts stated by DeCandolle, in his *Origin of Cult Pl*, indicate a probable Indian origin for this millet. In Egypt the [illegible]

HISTORY. 171

to the cultivated E. Coracana.

Varieties.—There are several so-called varieties of this plant, which differ chiefly according to their requirements as to soil and time of sowing. Under the name of E. stricta, Roxburgh has described the form which has the spikes quite straight. This kind requires a richer soil, and is often surprisingly productive.

Varieties. 172

CULTIVATION.

As this millet is cultivated over the greater part of India, it will be necessary to describe briefly the mode of growing it in certain typical regions

CULTIVATION. 173

1. *Himálayan Districts*—Mr. Atkinson says: "It is the staple autumn crop of the highlands (up to 8,000 feet) between the Tons and the Sárda, and forms the main food-resource of the agricultural classes It

HIMALAYAN DISTRICTS. 174

ELEUSINE Coracana.

The Marua or Ragi Millet.

CULTIVATION

gives a larger yield than other crops, and is said to increase in bulk when ground, qualities that have probably led to its more general cultivation, as it is a poor and very coarse grain." "*Mandua* is cultivated both in ordinary agricultural land and in freshly-cleared jungle. In ordinary land, it usually follows a wheat crop, which is gathered in April-May, and the land is at once prepared for the *mandua* in the same manner as for rice. The seed is sown broadcast, and instead of a harrow, the bough of a tree is drawn over the newly-sown land to cover the grain. When the young plants have risen two or three inches, the whole field is harrowed two or three times, and the vacant spaces are filled up from those where the plants are in excess." "Later on the crop is well weeded with the *kútala*, and in October-November the ears of the *mandua* are cut off." It is generally sown as a mixed crop along with pulses, &c., known collectively as *Kín*.

PANJAB. 175

2. *Panjáb.*—"In the Karnál District it is grown in fairly stiff soil, but chiefly in the Khádar, and then only in small quantities. It is sown in seed beds carefully dressed and manured. The seedlings are then planted out in land which has been twice ploughed, and dressed with the *sohágga*. It is watered once, or twice if the rains are late, and weeded once. The heads ripen slowly, and the ripe heads are picked off, and the grain beaten out . . . . . In dry seasons its cultivation as a food crop is largely increased, it being put in fields intended for *ziri*, which cannot be planted out owing to the drought" (*Gaz., Karnál Dist.*, 178). In the Kangra District it forms an import.

N. W. PROVINCES.

3. *North-Western Provinces and Oudh.*—"It is cultivated under two very different circumstances in these provinces. The most important position it fills is that of the chief food-grain of the hill tracts on their northern border, where it is very extensively cultivated. In Jaunsár Báwar it forms the chief article of food of the hill-men, and is grown on the very poorest soil, often yielding a crop from mere stones and shingle. It is, on the other hand, very rarely grown in the hilly country to the south of the Provinces, where its place is taken by *kodon*. But it is grown to a greater or less extent over the whole of these Provinces, and in the more fertile districts its cultivation is often attended with considerable care, and results in a very large weight of produce. It prefers light soils, and is sown at the commencement of the rains, at the rate of 10lb of seeds to the acre. In the Allahabad and Azamgarh Districts, it is reported to be occasionally sown in seed beds and transplanted like rice. In this case the seed is sown with irrigation in May, and the seedlings are planted out when the rains break. It suffers greatly from heavy rain, and a good year for rice is a bad year for *mandua*, and *vice versá*. It should be weeded two or three times, and when carefully cultivated, often receives a top dressing of manure after the first weeding. The yield is the heaviest of any of the minor millets, since not only is the gross weight of the produce large, but only a small proportion of this weight consists of husk. In this respect *mandua* is the most profitable of the minor millets. With *sawan* and *kodon*, for instance, the husk contributes almost 50 per cent. of the weight, while with *mandua* it only amounts to 4 or 5 per cent. Where carefully cultivated 12 to 14 maunds of grain may be expected to the acre, but in the hills a much smaller produce than this is gathered, and cultivators would be content with 5 or 6 maunds" (*Duthie and Fuller*).

MADRAS. 177

4. *Madras.*—In the Coimbatore District it is sown in nurseries and transplanted, when a few weeks old, to the fields. It is, however, best known as a garden crop, and is sown generally in June or July; in some localities it is a cold weather, in others a hot weather, crop. It is usually

The Marua or Ragi Millet. (J. F. Duthie) ELEUSINE Coracana.

CULTIVATION.

MADRAS

prepared by ploughing and manuring, and the seed is sown broad-cast with lines of castor, dholl, &c, in furrows at 10 or 12 feet apart, at about a month old it is interploughed and weeded The *ragi* is harvested about four months after sowing, and the dholl a month or two afterwards Threshing is performed after it has been heaped to sweat, when the grain becomes looser in the husk and is easily trodden out It is reaped

l it is *of the* wings Feb-

ruary The cost of cultivation is estimated at R10-8, the outturn at R18 12 It is often grown by irrigation, and is suitable for any soil. The millet is used as food, being prepared either as a cake with water or powdered and boiled

Ragi yields a valuable food-grain under moderate irrigation. It is easily grown and is extensively raised under wells during the hot season, being planted out from seed beds The best plan is to ridge up the land as is done for maize and cotton, and to plant the seedlings on both sides of the ridges. The crop is a difficult and expensive one to harvest, owing to the ears never ripening at one time, and it is also costly to thresh, the grain adhering with great persistency to the panicle (*Saidapet Experimental Farm Manual and Guide*).

In the Trichinopoly District there were 153,614 acres under *ragi* cultivation in 1888. *The crop is sown from May to August, and harvested* from September to December. In dry lands the annual outturn amounts to the value of R9, the cost of cultivation being R4-8, and the profit R4-8 In wet lands the yield attains to the value of R14, the cost of

middle of August. Sheep are then penned on the land for manure, and it is ploughed five or six times, till the soil is reduced to a fine consistency It is sown between the middle of August and the end of October. It is weeded after twenty or thirty days, and a second time after sixty days The crop is harvested from the latter part of December to the middle of January

NELLORE. 178

CULTIVATION.

January) and give it a little dung. Divide it into squares, and let it have some more manure. Then sow the seed very thick; cover it with dung, and give it water, which must be repeated once in three days. The ground into which it is to be transplanted is, in Pushya, ploughed five times, and must be dunged and divided into squares with proper channels, like a poppy garden. About the end of January, water the seedlings well, and pull them up by the roots, tie them in bundles and put them in water. Then reduce to mud the ground into which they are to be transplanted, and place the young *ragi* in it, with four inches distance between each plant. Next day water, and every third day for a month this must be repeated. Then weed with a small hoe, and water once in four days. It ripens in three months from the time when the seed was sown; and in a middling crop produces twenty-fold. It is only sown on the ground at times when no other crop could be procured, as the expense of cultivation nearly equals the value of the crop" (*Gaz. of Mysore and Coorg, I., 81*).

BOMBAY. 179

6. *Bombay.*—It is grown in the hill lands of the Násik District, sometimes under the wood-ash (*dalhi*) system. The seed is sown in burnt beds in the latter part of May, the seedlings are planted out in June or July, and the crop is reaped in October. It is widely grown in the hill forest country of Kánara, and the grain is generally eaten by the poorer classes. It is the principal crop on the hill lands of the Thána District, and is always cultivated as a first crop after a fallow. About twelve varieties are recognized, half of them early-ripening and the rest are late-ripening. The former are ripe in September and the latter in October. The crop is similarly treated and holds an important position amongst the food-grains in many other parts of the Presidency.

AREA UNDER ELEUSINE.

AREA.

The total area for all India cannot be ascertained, but the following are the areas returned as under the crop in Madras and Bombay for 1887-88:—Madras 1,551,000 acres; Bombay 802,000 acres.

CHEMISTRY. 180

Chemical Analysis of the Grain.—The following is the composition of *ragi* grain according to **Professor Church**:—

	In 100 parts.		In 1lb.		
	Husked.	Whole.			
Water	13·2	12·5	2 oz.	0	grains.
Albuminoids	7·3	5·9	0 ,,	413	,,
Starch	73·2	74·6	11 ,,	409	,,
Oil	1·5	0·8	0 ,,	56	,,
Fibre	2·5	3·6	0 ,,	252	,,
Ash	2·3	2·6	0 ,,	182	,,

The nutrient ratio is here 1 : 13, the nutrient value 84. The percentage of phosphoric acid in the whole grain is about 0·4 (*Food Grains of India, p. 89*).

FOOD. 181

Food.—Though eaten largely by the labouring and poorer classes of people in many parts of India, it is not considered to be very wholesome, being somewhat difficult of digestion. In Mysore the flour is dressed either in the form of a pudding, or is made into cakes fried in oil.

SPECIAL OPINION.—§ "It forms the food of four-fifths of the people of Mysore, and is largely eaten by the working classes in Southern India. It enters into jail diet. It is a highly nourishing millet, suited to working men. It sometimes produces diarrhœa, but this is due to bad grinding and non-separation of the coarse coating of the grain" (*Surgeon General W. R. Cornish, F.R.C.S., C.I.E., Madras*).

FODDER. Straw. 182

Fodder.—The STRAW is considered excellent fodder for cattle, and is said to improve by keeping. In the Mysore District cattle thrive and

work on it alone without requiring gram, which is not the case with respect to paddy straw Though considered heating it is sometimes given to horses when grass is scarce

DOMESTIC. 183

Domestic Use —A [illegible] from the seeds in the [illegible] distilled into spirit or [illegible] Sikkim Himálaya and [illegible] 175)

FODDER. 184

Eleusine flagellifera, *Nees ; Duthie, Fodder Grasses, N India, 57*

Syn E ARABICA, *Hochst*

Vern —*Chhimbar*, HIND ; *Gurdub*, N -W P ; *Chemri, chimbari, chhembar, kharimbar, dubra, gathil, ghantil* (*chu'rei* and *bháru*, Trans Indus, according to Stewart), PB , *Ganthia, gánth dob*, RAJ

References —*Aitchison, Cat Pb and Sind Pl , 167 , Journ Agri -Hort , Soc , 1885, Vol VII , New Series, 237*

Habitat —A small creeping [illegible] Northern [illegible]

FODDER 185

186

E [illegible], *Duthie, Fodder Grasses, N India, 57.*

Syn.—CYNOSURUS INDICUS, *Linn*

Vern —*Mal-ankuri*, HIND ; *Gurchówa* BUNDEL , *Jhingri, jhinjhor makraila gatha, gadha-charwa gatha* [illegible]

[illegible]

Refe[illegible]

[illegible]

Habitat A small, rather coarse-looking grass, abundant on waste ground and by road sides all over India, ascending to moderate ele[illegible] on the Himálayas, also in Burma [illegible]

FODDER. 187

Fodder —It is eaten by [illegible] some districts is considered [illegible] says that cattle are not fo[illegible] to the Bengal form, which th[illegible] rank and less palatable I[illegible] spoken of as a pasture grass

188

E. scindica, *Duthie, Fodder Grasses, N. India, 58.*

Syn —DACTYLOCTENIUM SCINDICUM, *Boiss*

Vern —*Mandjiro*, SIND, *Bhobra, bobriya*, PB ; *Ganthya, ganti ghas, jangli malicha, kharo-makro*, RAJ

Habitat.—A slender perenn[illegible] sandy tracts in Northern [illegible]

FODDER. 189

190

E. [illegible]ata, *Roxb ; Duthie, Fodder Grasses, N India, 58*

Vern.—*Jharna therna*, PB , *Chhinke, kuri chinke, kangri*, RAJ

References —*Roxb , Fl Ind , Fd C.B C , 116, Aitchison, Cat Pb and Sind Pl , 168*

Habitat.—Resembles E. indica, but is taller, and has the spikes arranged in verticels.

FODDER. 191

Fodder —It is said to be a good fodder grass for cattle, both in the Panjáb and in Rajputana

ELIONURUS, *Humb. & Bonpl.; Gen. Pl., III., 1129.*

[GRAMINEÆ.

192 **Elionurus hirsutus,** *Munro; Duthie, Fodder Gr., N. Ind., 28;*

Vern.—*Bhanjuri*, N.-W. P.; *Sin, sewan, shewar*, PB.; *Shinwan, siwan, pur in*, RAJ.

References.—*Aitchison, Cat. Pb. and Sind Pl., 173; Todd, Rájasthán, II., 256.*

Habitat.—A perennial grass, 1 to 2 feet high, with silvery pubescent spikes of florets. It grows in sandy parts of the Panjáb, also in Sind and Bundelkhand, and is a characteristic plant of the Rájputána desert tract.

FIBRE. Roots. 193 Fibre.—The ROOTS are said to yield a fibre used for weavers' brushes.

FOOD. Seed. 194 Food.—Todd mentions that in Bikanir, where this grass is abundant, the SEED is collected, and, mixed with *bájra* flour, is largely consumed by the people.

FODDER. 195 Fodder.—Nutritious, and when young affords excellent grazing. Coldstream says it is a good stacking grass and will keep good for ten years.

Elm, see Ulmus campestris, *Linn.*

ELSCHOLTZIA, *Willd.; Gen. Pl., II., 1181.*

196 **Elscholtzia polystachya,** *Benth.; Fl. Br. Ind., IV., 643;* LABIATÆ.

Vern.—*Bhaurria*, KUMAON; *Kangchari, mehndi, dúse, pothi, garudar, tappaddar*, PB.

References.—*Gamble, Man. Timb., 301; Stewart, Pb. Pl., 168; Atkinson, Him. Dist., 315.*

Habitat.—A shrub or under-shrub, common on the Himálaya, from Kashmír to Sikkim, up to 9,000 feet; also on the Khásia Hills.

DYE. 197 Dye.—South of Kashmír it is said to be used as a DYE (*Stewart*).

TIMBER. 198 Structure of the Wood.—Grey, moderately hard, splits and cracks, and in seasoning separates into concentric masses. Annual rings distinctly marked by a belt of numerous and larger pores in the spring wood.

EMBELIA, *Burm.; Gen. Pl., II., 644.*

[MYRSINEÆ.

199 **Embelia Ribes,** *Burm.; Fl. Br. Ind., III., 513; Wight, Ic., t. 1207;*

Syn.—E. GLANDULIFERA, *Wight.*

Vern.—*Baberang, wawrung*, HIND.; *Biranga, bhai-birrung*, BENG.; *Bái-bidanga*, URIYA; *Bebrang*, SYLHET; *Himalcheri*, NEPAL; *Vishaul*, MAL (S.P.); *Babrung*, PB.; *Babrang*, PUSHTU; *Baibrang, wonding*, C. P.; *Bhringeli*, MELGHAT; *Karkannie, vavarang*, BOMB.; *Karkannie, vavadinga* (fruit), MAR; *Vavading*, GUJ.; *Bebrang*, SYLHET; *Váyu-vilangam, vellal*, TAM.; *Váyu-vilamgam*, TEL.; *Vayivalanga*, KAN.; *Wel-ambilla*, SING.; *Vidanga*, SANS.

The Conservator of Forests, Panjab, in a recent report, states that in Hazára "the berries called *Bebrang* is the fruit of the *Kokhur* (Myrsine africana). The fruit of E. Ribes is known as *Baibarang* or *Wai varang*.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 197; Voigt., Hort. Sub. Cal., 337; Brandis, For. Fl., 284; Kurz, For. Fl. Burm., II., 101; Thwaites, En. Ceylon Pl., 172; Dals. & Gibs., Bomb. Fl., 137; Elliot, Fl. Andhr., 190, U. C. Dutt, Mat. Med. Hind., 187 and 323; Dymock, Mat. Med. W. Ind., 471; S. Arjun, Bomb. Drugs, 83; Murray, Pl. and Drugs, Sind, 168; Irvine, Mat. Med. Patna, 16; Med. Top. Oudh, 32; Drury, U. Pl., 194; Birdwood, Bomb. Pr., 51; Balfour, Cyclop., 1045; Treasury of Bot., 448; Kew Off. Guide to the Mus. of Ec. Bot., 90; Mysore, Cat. Cal. Exh., 21; Home Dept. Cor., 316.*

Habitat.—A large climbing shrub, abundant in the hilly parts of India, from the Central Himálaya to Ceylon and Singapore; also in Burma.

The Bayabirang, a useful Anthelmintic. (*J. F. Duthie.*)

EMBELIA robusta.

MEDICINE Seeds. 200

Medicine.—According to Susruta the SEEDS of the plant have been described as anthelmintic, alternative, and tonic. Later writers (Dr. U. C. Dutt informs us) recommend it as a carminative, stomachic, and anthelmintic medicine. In the special report from Hazara (quoted above), it is stated that "the berries are prescribed by Hakims in affections of the kidney; they are viewed as a perfect anthelmintic. Dose 6½ drachms of very finely powdered and previously shelled berries being given in a cup full of butter milk taken on an empty stomach, the first thing in the morning." Many authors allude to them as entering into the composition of several [illegible] skin diseases. Royle says that they [illegible] Dymock, that it is a common practice [illegible] put a few berries of the *vaivarang* plant in the milk that is given to young children, they are supposed to [illegible]

[illegible] Used in Mysore externally by itself or in combination. (*Surgeon-Major John North, Bangalore*). "Half an ounce in powder mixed with '*dahi*' (curd) taken on empty stomach is a sovereign remedy for tape [illegible]

FOOD. Seeds. 201

202

[illegible]

References.—*Roxb., Fl. Ind., Ed. C.B.C., 197; Voigt, Hort. Sub. Cal.,* [illegible] *, 103; Beddome,* [illegible] *, Fn. Ceylon Pl.,* [illegible] *al., V., 23, t. 12;* [illegible]

[illegible] sub-Himálayan [illegible]

MEDICINE. Fruit. 203

Leaves 204

Bark. 205

Berries. 206

[illegible] Ribes, is given [illegible] remarks that the greater portion of the *bayabirang* exported from Kumáon seems to be the fruit of Myrsine africana. In the *Treasury of Botany* it is mentioned that the young LEAVES, in combination with ginger, are used as a gargle in cases of sore-throat; that the dried BARK of the root is a reputed remedy for [illegible] an ointmen[illegible]

SPECIAL [illegible] mintic" ([illegible]

FOOD. Fruit. 207

Food.—In Orissa the FRUIT is eaten by the poorer classes. Like that of E. Ribes it is collected and sold as an adulterant for black pepper. On Parisnath, Behar, this is said to be a regular trade.

Emblic myrobalan, see Phyllanthus Emblica, *Linn.*

Emerald, see Precious Stones and Rubies.

Endive, see Cichorium Endivia, *Linn.*; Vol. II., p. 285.

208

ENGELHARDTIA, *Leschen.; Gen. Pl., III., 399.* [JUGLANDEÆ.

Engelhardtia Colebrookiana, *Lindl.; Fl. Br. Ind., V., 596;*

Vern.—*Khusam,* BUNDEL.; *Mowa, gobar-mowa, bodal-mowa, mao,* KUMAON; *Timar rákh,* PB.

References.—*Brandis, For. Fl., 499; Kurz, For. Fl. Burm., II., 491; Gamble, Man. Timb., 393; Aitchison, Cat. Pb. and Sind Pl., 140; Atkinson, Him. Dist., 317; Royle, Ill. Him. Bot., 342.*

Habitat.—A small deciduous tree of the outer North-West Himálaya, ascending to 6,500 feet; often gregarious. Sir D. Brandis suggests the probability of this being shown to be only a tomentose and small-sized variety of E. spicata, in which opinion Sir Joseph Hooker (in *Fl. Br. Ind., l.c.*) is inclined to agree.

TIMBER. 209

Structure of the Wood.—"Grey with a reddish tinge, moderately hard, even-grained, seasons and polishes well, but is not durable (*Gamble*).

210

E. spicata, *Bl.; Fl. Br. Ind., V., 595.*

Syn.—E. ROXBURGHIANA, *Lindl.;* JUGLANS PTEROCOCCA, *Roxb.*

Vern.—*Silapoma,* HIND.; *Bolas,* BENG.; *Rumgach,* ASSAM; *Dinglaba,* KHASIA; *Bor-patta-jam,* CACHAR; *Vakru,* GARO; *Mowa, mahua,* NEPAL; *Suviak,* LEPCHA.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 670; Voigt., Hort. Sub. Cal., 296; Brandis, For. Fl., 500; Kurz, For. Fl. Burm., II., 491; Gamble, Man. Timb., 393; Rumph., Herb. Amb., II., 169; Royle, Ill. Him. Bot., 342; Ind. For., I., 92.*

Habitat.—A large, handsome, sub-deciduous tree, found in the Terai and outer hills of Eastern Himálaya up to 6,000 feet; also in Chittagong and Burma.

TAN. Bark. 211

Tan.—Roxburgh states that its thick brown BARK possesses much tannin, and is reckoned by the natives as the best material they are acquainted with for tanning purposes.

TIMBER. 212

Structure of the Wood.—Similar to that of E. Colebrookiana, showing a beautiful grain on a radial section. It is used in Sikkim for tea-boxes and building; in the Khásia Hills and Cachar for planking, and spoons are made of it. It does not warp.

ENHYDRA, *Lour.; Gen. Pl., II., 360.*

213

Enhydra fluctuans, *Lour.; Fl. Br. Ind., III., 304;* COMPOSITÆ.

Syn.—E. HELONCHA, *DC.;* HINGTSHA REPENS, *Roxb.*

Vern.—*Harhuch,* HIND.; *Hingchá,* BENG.; *Hilamochiká,* SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 609; Voigt., Hort. Sub. Cal., 416; U. C. Dutt, Mat. Med. Hind., 185, 300.*

Habitat.—Found in East Bengal, Assam, and Sylhet, frequenting rich damp soils.

MEDICINE. Leaves. 214

Medicine.—According to Dutt the LEAVES of this aquatic plant are regarded as laxative, antibilious, and useful in diseases of the skin and nervous system. Prescribed as an adjunct to tonic metallic medicines given for neuralgia.

Juice. 215

SPECIAL OPINIONS.—§ "Expressed JUICE of the leaves is used as demulcent in cases of gonorrhœa; it is taken mixed with milk, either of cow or goat. The leaves are pounded and made into a paste which is

(*Shib Chundra Bhattacharji, Chanda, Central Provinces*).

Food.—"The LEAVES of this water plant are eaten by the natives as a vegetable. Being somewhat bitter they are regarded as wholesome and invigorating" (*U. C. Dutt*).

FOOD. Leaves. 216

ENICOSTEMA, *Blume; Gen. Pl., II., 807.*

[*t. 600 (Adenema)*; GENTIANACEÆ

Enicostema littorale, *Blume; Fl. Br. Ind., IV., 101; Wight, Ic.,* 217

Syn.—CICENDIA HYSSOPIFOLIA, *W. & A.*; HIPPION ORIENTALE, *Dalz. & Gibs.*; GENTIANA VERTICILLATA, *Linn.*

MEDICINE. 218

contain a pound or more."

Ensilage, see Fodder.

ENTADA, *Adans.; Gen. Pl., I, 589.*

Entada scandens, *Bth.; Fl. Br. Ind., II., 287;* LEGUMINOSÆ. 219

Ec. Bot., its People,

503, 771.

Habitat.—A large climber of the forests of the Eastern Himálaya (ascending to 4,000 feet in Sikkim); Eastern Bengal, South India, Manipur, Burma, and the Andaman Islands. Cosmopolitan in the tropics.

EPHEDRA.

The Gilla Nut; made into snuff-boxes, &c.

FIBRE. Bark. 220

Fibre.—According to **Dr. Thwaites** the tough BARK of this plant is used in Ceylon for cordage and ropes.

OIL. Seeds. 221

Oil.—An OIL is said to be expressed from the SEEDS, the properties of which are not known.

MEDICINE. Seeds. 222

Medicine.—A preparation from the SEEDS is used in pains of the loins and also in debility. **Dr. Dymock** remarks that "the properties of the seeds do not appear to have been tested in European practice; among the natives they have the reputation of being emetic." **Dr. Mason** says that in Burma they are, in native Materia Medica, used as a febrifuge. Along with the seeds of several other leguminous plants they are often found mixed with Calabar beans in consignments exported from tropical Africa, and all are known to the natives under the name of '*garbee*' beans. An infusion of the spongy FIBRES of the stem is said to be used with advantage for various affections of the skin in the Philippines (*Dalz. & Gibs., Bomb. Fl., 84*).

Fibres. 223

SPECIAL OPINIONS.—§ "The kernels of the seeds are used by the natives as stomachic, carminative, and anodyne, in cases of recent confinement. The drug is said to excite appetite, check fever, relieve pain, and regulate the functions of the chylopoietic viscera" (*Civil Surgeon J. H. Thornton, B.A., M.B., Monghyr*). "Powdered kernel mixed with some few spices, is commonly taken by native women for some days immediately after delivery, for allaying the bodily pains and warding off cold" (*Assistant Surgeon Anund Chunder Mookherji, Noakhally*).

FOOD, Pods. 224

Food.—The PODS contain large, flat, hard, polished, chestnut-coloured seeds, or rather nuts, which, on being steeped in water and afterwards roasted, are sometimes eaten by the natives.

DOMESTIC. 225

Domestic Uses.—**Birdwood** mentions that the pods, which are often as much as 4 feet in length, are used by the police in the West Indies. According to **Dr. Thwaites** the juice of the leaves is employed in Ceylon for stupefying fish. The large ornamental seeds are frequently made into snuff boxes, match-boxes, &c.; and **Royle** alludes to the fact that the Nepálese make use of a preparation from them as a hair-wash. The most general use, however, to which these seeds are applied, is for crimping linen. **Dr. Bonavia**, writing from Etáwa, contributed the following account of the process of employment, to the Transactions of the Agri-Horticultural Society, Calcutta :—

"Dhobis up here, and probably also down in Bengal, use a curious kind of nut for crimping linen, without using any crimping irons. This nut they call in Oudh '*Gelha,*' and here '*Chian,*' the latter means a seed. They say it is brought from Bengal and sold in Cawnpore . . The Dhobis cut one side, and scoop out the kernel; then they introduce two fingers into the cavity, and quickly stroke the damp linen forwards with its polished surface. This crimps it beautifully crossways."

226

EPHEDRA, *Linn.; Gen. Pl., III., 418.*

(*George Watt.*)

A genus of erect or sub-scandent rigid shrubs, comprising some eight or ten species (or, according to certain authors, three times that number); met with in Europe, temperate Asia, and South America. The EPHEDRÆ belong to the natural order GNETACEÆ—a family closely allied to the CONIFERÆ. They have opposite or fascicled, terete, striate, jointed, branches; also opposite scales at the joints, and in the axils of these occur solitary or fascicled minute cones. The flowers are uni-sexual, and the plants often even diœcious. On this account it is probable the males and females have been described as different species; and, moreover, they are extremely variable plants, being much influenced by soil and humidity. In India one species only can be said to occur throughout the Himaláya, *viz*, **E. vulgaris**, *Rich.* (=**E. Gerardiana**, *Wall.*); but this is also distributed to Central and Western Asia and to Europe. The other two Indian

The Soma and Homa. (G Watt) EPHEDRA.

HISTORY. 227

Interest has recently been taken in these curious plants from the observation that the dried twigs of an Ephedra imported from Persia into Bombay constitute the sacred *Homa* of the Parsis A sample of the *Homa* obtained in Bombay was at first determined as Periploca aphylla—an erect, leafless perennial, with twigs as thick as a goose-quill or less, and possessing a milky sap Subsequent examination of other samples, however, revealed the fact that the *Homa* of the Parsis was in reality an ... received support from the in- ... botanical report in connection ... where it is stated Ephedra ... valley, the names of *Hum, huma, yehma.* Dr. Aitchison states of that plant that it was found "a

grape had in the worship of Bacchus The question has often been discussed, what kind of plant this *Soma* could have been? When *Soma* sacrifices are performed at present, it is confessed that the real *Soma* can no longer be procured, and that some *Ci-prés*, such as *Putikás*, &c., must be used instead. Dr. Haug, who was present at one of these sacrifices and was allowed to taste the juice, had to confess that it was extremely nasty and not at all exhilarating. Even in the earliest liturgical works, in the Sûtras and Brâhmanas, the same admission is made, namely, that the true *Soma* is very difficult to be procured, and that substitutes may be used instead. When it was procured, it is said that it

Oriental Society an account of the plant.' "After describing the peculiar rules for buying and rebuying the *Soma* from northern barbarians, as

sour, without leaves, milk ... produces vomiting, and ... to the opinion of Sir J. ... temma, which alone, of a ... *and milky; but I remarked at the same time that the fact of this* Sarcostemma growing in the Presidency of Bombay militated against this identification, because the true *Soma* must be a northern plant, which was replaced in India itself by *Pûtikás* or similar substitutes.

EPHEDRA.

The Soma.

HISTORY.

I cannot vouch for the exact age of the *Ayur-veda*, but I doubt whether we shall find any scientific description of the *Soma* of an earlier date."

Since, however, it is stated in the Sûtras and Brâhmanas that substitutes at even that early period had to be used, may it not be that the description in the *Ayur-veda* is the description of the best known substitute? Sarcostemma would be difficult to procure in most parts of this country; it would, in fact, have to be imported from the Deccan to Upper and Northern India. The description, however, would agree admirably with that of a Sarcostemma. Assuming the determination correct the substitutes for it—the *Pûtikâs*—one of which was the *Pui-sak* (Basella) would, when deprived of their leaves, closely resemble the twigs of Sarcostemma. Added to all this we have the fact that Roxburgh calls Sarcostemma brevistigma the *Soma luta* (or *Soma-climber*), and says of it that it has so much milky juice of a mild nature "that native travellers often suck the tender shoots to allay their thirst." Mr. Duthie gives the name *Soma* to the grass Setaria glauca; and a very large number of other plants in the various dialects of India have names like *Soma* or *Homa*. For example, Veronia anthelmintica is, in Hindústani, known as *Soma-raj*; so also is Pœderia fœtida. A creeper with fleshy stems and milky sap, however, must of necessity almost, be a member of the ASCLEPIADEÆ or of the EUPHORBIACEÆ. Some of the species of Ephedra are sub-scandent, leafless shrubs, but they have not got a milky sap; and far from being likely to cause vomiting when taken, they are pleasant in flavour and not unlike the hops of Europe. But the twigs of Sarcostemma are certainly not dark, but rather of a delicate succulent green colour. They might turn black when removed from the plant in the form ready for export, but would only do so when the whole of the milky sap had been dried up. The word "dark" would, however, be perfectly applicable to the brownish twigs of the leafless shrub Periploca aphylla. That plant has a milky sap, and Dr. Aitchison informs us that in Northern Baluchistan it is known as *Um* or *Uma*. Of Periploca hydaspidis, *Falc.* (which Aitchison collected at Jelamai near Shinak), he wrote—"it is quite impossible to distinguish it, as it grows, from Ephedra ciliata, *Fisch. & Mey.*" A wild species of grape vine is in Kashmír known as *Um* or *Umbur*, and in most of the languages of India the imported grapes, brought into this country are known as *Angúr*, a Persian name. Its Sanskrit name is *Draksha*. A grape grown in Europe and Australia is known as "the Kashmir."

Thus it would appear that the evidence derived from modern vernacular names largely breaks down. Dr. Dymock, at the writer's suggestion, examined the *Homa* plant used in Bombay by the Parsís, and pronounced it to be Periploca aphylla. A sample was afterwards sent to Kew, and Mr. W. T. Thiselton Dyer wrote that "the *Homa* of the Parsís is undoubtedly Ephedra vulgaris." Acting on this assurance the writer, through the kindness of Dr. Dymock, had a sample of Ephedra vulgaris chemically analysed, with the result that the opinion he formerly advanced seemed to be confirmed, *viz.*, that it afforded a bitter principle which might have been employed much after the same manner as hops are used in Europe and Acacia bark in India, *e.g.*, as a bitter adjunct in the preparation of an alcoholic beverage similar to beer or to the Angami Naga *Zú* from rice. It would now, however, appear from a renewed study of the facts since brought to light, that Periploca may have an even stronger claim to consideration than Ephedra. It seems probable that both plants are used by the Parsís, and assuming that the names *Homa* and *Soma* referred to one and the same thing originally, it may be worth while suggesting that a chemical analysis of Periploca should be made in order to determine if it affords, like Ephedra, a harmless bitter principle. It is a

HISTORY.

vegetable." The majority of the plants belonging to this family act as

possess

There

a, while

parts of

ılty. If

ıa, they

failed to recognise the plant in India, and it was perhaps only after they had penetrated to the extreme southern and western limits of their new empire (where Periploca does not occur) that they first discovered a plant which seemed to deserve the ancient and sacred name *Soma*, the Sarcostemma of botanists.

cyperaceous plant (vulgarly a grass), and among many others a Terminalia which might answer to the *Arjuna* specified in certain passages in Sanskrit works as one of the *Soma* substitutes. The Santals use a plant known to them as *Saram lutur* (Clerodendron serratum) when they wish

* An expression which might be accounted for by the remarkable similarity of the long round fruits of Periploca to portions of the stem.

EPHEDRA. The Soma.

HISTORY,

to make their liquor specially intoxicating; and it is said that even from the milky juice of **Calotropis gigantea** (the *Ak, ákanda* in Bengal; the *Ushar*, in Arabic; *Khark* in Persian, and the *Arka, alarka* of Sanskrit) an alcoholic beverage may be prepared. Since most writers hold that the long grapes of Afghánistan, which might not inaptly be compared to the joints of the human fingers, cannot be admissible, the final conclusion which the writer has come to regarding the so-called *Soma* plant of the ançient Vedic literature is, that it would be safer to view the references to that plant as indicating *an early discovery of the art of fermentation** than to seek to establish any special and peculiar plant which may have been first so used. The disappearance of all knowledge in any such special plant (the first fermenting agent), might on this hypothesis be attributed to the discovery of better and easier processes both in the original home of the *Soma* and in the country of Aryan adoption, until the practice lost its sacred associations in the prevalent use of the substitutes. The sacerdotal injunctions might have survived for a time, and substitutes which resembled but possessed none of the properties of the original *Soma* might easily be supposed to have been used by the priesthood, while the art of fermentation became a domestic industry.

Some short time ago, the writer published a few notes on the subject of the *Soma* plant, suggested on reading **Professor R. von Roth's** paper in the German Oriental Society's Journal for 1884. He instituted a correspondence on *Soma* with certain eminent scholars, and a few of their replies may appropriately be here reproduced. These will be found to support the main contention advanced above that the *Soma* was an adjunct in the preparation of the beverage of the ancient Aryans, but did not itself afford a sweet exhilarating fluid.

Dr. Dymock wrote: "On looking over the *Zend Avesta*," &c., &c., "it appears to me that the *Homa* or *Soma* was not used to obtain liquor from its juice, but that only a small portion of it was added to liquor obtained from grain. The Parsí priests say that the *Homa* never decays, and they always keep it for a considerable time before they use it." It may therefore be remarked—if the *Homa* and *Soma* are the same thing, this fact is utterly at variance with **Dr. Roth's** interpretation of the Sanskrit passages regarding the *Soma* not keeping.

Dr. Rice, of New York, a distinguished Sanskrit scholar said:—

"For your interesting pamphlet on the *Soma* plant I am much obliged. Of course I had read the papers by **Professor Roth** already in the original German, but the additional remarks now accompanying them are also interesting. I have often tried to reconcile the apparent objections against the *Soma* to be plain and simple sugarcane, but have not been able to overcome the apparently well-authenticated statements as to the altitude over the sea level and other data which positively prohibit such a belief. But the description of the plant, its pleasant juice, &c., &c., aside from other considerations, make one think of sugarcane or some species of **Sorghum**."

This is certainly a most interesting suggestion; but apart from other difficulties, it seems impossible to suppose that branches of sugarcane could have been carried from Central Asia to India so as to still contain their sweet sap. As a matter of fact, the sugarcane sap, in India, dries up completely in less than a month. Sugarcane (**Saccharum officinarum**) is very likely a native of South-Eastern Asia—from Bengal to Cochin-China. It was probably first systematically cultivated in India. It is therefore highly improbable that any form of sugarcane was cultivated in Central Asia during the Vedic period, or was, perhaps, even known to the Sanskrit-speaking people prior to their invasion of India. Most of the

* In Siberia the ermine-hunters, when their yeast fails, use the inner bark of the pine as a ferment.

HISTORY.

Indian and European names for sugar appear to be derived from the Sanskrit *Sarkara*, but it does not follow that *Sarkara* was, in its original

while adding that a similar word exists in some of the Southern and Eastern languages of India for the date-palm Thus it is *Ichan* or *Ishan* in

to be favoured with a complete series of the passages relating to the *Soma* from Sanskrit authors Dr. Mitra wrote —

e enjoin the use of the juice this interpretation of the would be in vain to search *Soma* The word 'Sweet,' which has so much puzzled the learned Professor von Roth, may be safely, nay appropriately, used in a poem in praise of bitter beer" (*G Watt, Editor, Dictionary, Economic Products of India*)

228

Ephedra pachyclada, *Boiss*, *Fl Br Ind*, *V*., *641*, GNETACEÆ

TAN. Branches 229

part of the country also

FOOD. Fruit. 230

Food —The small red FRUIT is eaten, according to Aitchison.

DOMESTIC 231

Domestic Use —The ashes, Aitchison says, are used either mixed with or in lieu of snuff Griffith also makes mention of an Ephedra near the Khyber as being used for the same purpose.

232

E. peduncularis, *Boiss* ; *Fl Br Ind*, *V*, *641* ; *Brandis*, *For. Fl*., *t. 69*

Syn —I ALTE, *Brand*

Vern.—*Anchan, nikki kurkan, bratta, tandala, lastak, mangarwal* PB, *Bandukdi*, TRANS IND, *Alte*, ARAB

References —*Brandis For Fl 501; Aitchison Cat Pb and Sind Pl, 143; Raj Gaz., 30 Flgew, Journ Linn Soc, VI, 194*

Habitat.—A tall scandent shrub, often glaucous, with slender branches common, on stony ground, in Sind, the Panjáb, and Rájputána.

DOMESTIC. 233

Domestic Use.—Bunches of the stem and branches sometimes used on the Salt Range for cleaning brass dishes.

234

Ephedra vulgaris, *Rich.; Fl. Br. Ind., V., 640.*

Syn.—E. GERARDIANA, *Wall.*; E. DISTACHYA *and* MONOSTACHYA, *Linn.*

Vern.—*Amsánia, butshur, budshur, chewa,* PB.; *Khanda, khama,* KUNAWAR; *Tse, tsapatt, trans,* LADAK; *Phok,* SUTLEJ VALLEY.

References.—*Brandis, For. Fl., 501; Gamble, Man. Timb., 394; Stewart, Pb. Pl., 228; Boiss, Fl. Or., V., 713; Atkinson, Him. Dist., 318; Econ. Prod., N.-W. Prov., Part V., 89; Royle, Ill. Him. Bot., 348; Ind. For., January 1885, Vol. XI., 5; Jour. Agri.-Hort. Soc. Ind., Vol. IV., Selections, p. 263.*

Habitat.—A small low growing rigid shrub, abundant in the drier regions of the temperate and alpine Himálaya, from Western Tibet to Sikkim, ascending to 16,000 feet. It is abundant on the Shalai hill north of Simla at an altitude close on 10,000 feet.

TAN. 235

Tan.—Specimens of the twigs, &c., collected near Simla, were analysed by Dr. Dymock. The yield was only 3 per cent. of tannin, giving a whitish precipitate with gelatine and with acetate of lead, and a greenish precipitate with acetate of iron.

MEDICINE. 236

Medicine.—Aitchison remarks that some part of the plant is used medicinally in Lahoul (*Proc. Linn. Soc., X., 77*).

FOOD. 237

Food.—*Dr. Stewart says that the red berries have a not unpleasant,* mawkish, sweet taste, and are sometimes eaten by the natives of the Panjáb Himálaya. They are also eaten in Kumaon.

FODDER. 238

Fodder.—The plant is browsed by goats.

TIMBER. 239

Structure of the Wood.—Whitish-yellow. Occasionally used as fuel.

240

Epicanta nepalensis, *Moore*; COLEOPTERA.

An insect recommended as a substitute for Cantharides; see Vol. II., 128.

Epicarpurus orientalis, *Bl.*, see Streblus asper.

Epsom salts, or Epsomite, see Magnesia.

EQUISETUM, *Linn.*

(*J. F. Duthie.*)

241

Equisetum debile, *Roxb.*; EQUISETACEÆ.

Vern.—*Buru-katkom-charec',* SANTAL; *Matti, skinung, bandukei, nari, trotak, búki,* PB.; *Myet-sek,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 745; Voigt., Hort. Sub. Cal., 560; Stewart, Pb. Pl., 267; Aitchison, Cat. Pb. and Sind Pl., 178.*

Habitat.—A perennial vascular cryptogam with creeping rhizomes, and weak fluted stems, composed of superposed jointed tubes. Found in wet situations in the Panjáb, North-Western Provinces, Bengal, and Burma.

MEDICINE. Plant. 242

Medicine.—"The PLANT is administered as a cooling medicine, and near Jhelum is given for gonorrhœa" (*Stewart*).

FODDER. 243

Fodder.—According to Dr. Stewart, it is at times given to cattle as fodder.

DOMESTIC. 244

Domestic Use.—Joints of the stem are used by the natives for cleaning the surface of the nails.

Equus, see "Horses, Mules, and Asses."

ERAGROSTIS, *Beauv.; Gen. Pl., III., 1186.*

245

Eragrostis abyssinica, *Link.; Duthie, Fodder Grasses, N. Ind., 66.*

An Abyssinian species, largely grown in the mountainous districts of that country for its grain, of which the natives make bread. It is called

"Teff" "Thaf," or "Thef," and there are two distinct varieties, white and red, the former is sown as a cold season, and the latter as a rainy season, crop Experiments recently undertaken at Saharanpur with seed received from the Royal Gardens, Kew, indicate the possible utility of the plant in this country for fodder purposes For further particulars see *Kew Bulletin of Miscellaneous Information*, No 1 (1887)

Eragrostis bifaria, *W. & A*, *Duthie, Fodder Grasses, N India, 61* — 246

Syn —POA BIFARIA, *Vahl*

Vern —*Punya safed, chota-bhankla* (Ajmere), *mos* (Mt. Abu), RAJ, *Wooda tallum*, TEL

References —*Roxb*, *Fl Ind*, *Ed C B C 111*, *Thwaites, En Ceylon Pl*, *373*

Habitat.—A perennial grass with wiry stems about one foot high Common on dry rocky ground in hilly parts of India In Ceylon up to 5,000 feet

Fodder —At Ajmere it is considered a good fodder grass, it is eaten by cattle on Mount Abu — FODDER. 247

E. Brownei, *Nees*, *Duthie, Fodder Grasses, N Ind, 62* — 248

Syn.—POA BROWNEI, *Kunth*

Vern —*Jenkua*, ROHILKHAND, *Khari*, BUNDELKHAND, *Asata, chir* (Seoni) C P, *Chota khuds*, BERAR

References —*Thwaites, En Ceylon Pl*, *373 Aitchison, Cat Pb and Sind Pl*, *169*

Habitat.—A perennial grass with stems about one foot high and bearing numerous closely packed dark coloured spikelets It is plentiful in wet places all over India, ascending to moderate elevations on the Himálaya

Fodder —No definite information has been obtained regarding the feeding value of this grass in India, though no doubt it is eaten by cattle along with other grasses. In Australia, according to Baron von Mueller, it is looked upon as a good pasture grass, yielding an abundance of food both winter and summer — FODDER. 249

E. ciliaris, *Link*, *Duthie, Fodder Grasses, N Ind, 62.* — 250

Syn —POA CILIARIS, *Linn*, P CILIATA, *Roxb*

Vern.—*Undar-punchha* JEYPUR, *Tor chandbol* SANTAL.

References —*Roxb*, *Fl Ind*, *Ed C B C*, *112*, *Dals & Gibs*, *Bomb* [illegible]

FODDER 251

E. cynosuroides, *R & S*, *Duthie, Fodder Grasses, N Ind, 62* — 252

Syn.—POA CYNOSUROIDES *Retz*; BRIZA BIPINNATA *Linn*

Vern —*Dab dab, durva, darol*, HIND; *Kusha* BENG; *Dabri* BUNDEL; *Dab, dhab dabos, kush*, N W P; *Dib dab, dhab drab drabh kusa*, [illegible]

716; Dals & Gibs., Bomb Fl, 298; Stewart, Pb Pl, 254; Aitchison Cat Pb and Sind Pl 169 Elliot Fl Andhr, 17 46, 105, Dymock Mat Med W Ind, 2nd Ed., 854, S Arjun Bomb Drugs 153 Year Book Pharm, 1878, p 253; Baden Powell Pb Pr, 383; Atkinson, Him Dist, 735, 607; Lisboa U Pl Bomb, 279 284 290; Birdwood Bomb Pr, 347, Royle Ill Him Bot, 427; Balfour, Cyclop, III, 237; Taylor, Topography of Dacca, 60.

with in most parts of India Both are annual grasses with

Fodder —Used more or less as fodder for cattle and horses

FODDER. 258

Eragrostis nutans, *Nees , Duthie, Fodder Grasses, N Ind , 63* 259

Syn —POA NUTANS, *Retz* P INTERRUPTA, *Roxb*

Vern —*Lál-bali, asaunra mumkara,* BUNDEL *Lamcha, rasaurah, ghui,* N W. P ; *kutti pushli, sur, lumra,* PB , *Gnodila, ghorila, khajuria* C P , *Nakurmaral, naka naru, urenka uranke,* TEL

References —*Roxb , Fl Ind , Ed C B C , 112, Voigt , Hort Sub Cal ,* ... *& Gibs , Bomb Fl , 298, Elliot Fl Andhr , 123 187*

narrow spikes, which often It is usually met with in water-courses and borders

Fodder —Though not a first-class fodder grass, cattle eat it readily when other better kinds have failed.

FODDER. 260

E. pilosa, *Beauv ; Duthie, Fodder Grasses, N Ind , 64* 261

Kutaki, C P *tson, Cat Pb and*

FODDER. 262

remarks that cattle eat it readily, and that it would make good hay According to Mr Lowrie it is considered to be a good fodder grass at Ajmere.

E. plumosa, *Link ; Duthie, Fodder Grasses, N Ind , 64* 263

Syn —POA PLUMOSA, *Retz*

soil

variety (var densiflora, d resembling forms of

produce excellent hay at Allahabad In Rájputana it is valued as a fodder grass

FODDER. 264

E. tenella, *Beauv ; Duthie, Fodder Grasses, N. Ind , 65* 265

Syn.—POA TENELLA, *Linn*

Vern —*Ich kor',* SANTAL; *Bharburi* N W P , *Mondiajori,* C P

References —*Roxb , Fl Ind , Ed C B C , 113 ; Voigt, Hort Sub Cal , 71*

said to be nutritious

FODDER. 266

267 **Eragrostis rachitricha,** *Hochst.; Duthie, Fodder Grasses, N. Ind.,* 65, 89.

Syn.—POA MULTIFLORA, *Roxb.*; E. TREMULA, *Hochst.*

Vern.—*Kalunji, bhamiri, bánsa,* N.-W. P.; *Chankan buti, laki,* PB.; *Chiri-ka-khet, chiri-ka-chunwalia,* RAJ.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 114; Voigt, Hort. Sub. Cal., 716; Dalz. & Gibs., Bomb. Fl., 298; Aitchison, Cat. Pb. & Sind Pl., 169.*

Habitat.—An annual, with stems 1—1½ feet. The extremely slender pedicels, which support the long many-flowered spikelets, give rise to the constant tremulous motion exhibited by this species when in flower. It is a characteristic grass of sandy soils in North India.

FOOD. 268 Food.—The grain is said to have saved many lives during the severe famine of 1813, and which is now alluded to as the *lakiáwála sál.*

FODDER. 269 Fodder.—Regarded as a good fodder grass at Ajmere.

EREMOSTACHYS, *Bunge; Gen. Pl., II., 1215.*

270 **Eremostachys Vicaryi,** *Benth.; Fl. Br. Ind., IV., 695;* LABIATÆ.

Vern.—*Gurgunna, khaldtrá, rewand chini,* PB.

References.—*Stewart, Pb. Pl., 168; Aitchison, Cat. Pb. & Sind Pl., 119.*

Habitat.—A beautiful, yellow-flowered plant, common on the Salt Range, ascending to 2,500 feet; also met with at Peshâwar.

MEDICINE. Seeds 271 Medicine.—The SEEDS are given as a cooling medicine.

DOMESTIC. 272 Domestic Use.—The plant is said to be used in the Eusufzai near Peshâwar for poisoning fish.

EREMURUS, *Bieb.; Gen. Pl. III., 787.*

273 **Eremurus spectabilis,** *M. Bieb.; Baker in Linn. Soc. Journ. XV.,* [280; LILIACEÆ.

Vern.—*Shili, bre, prau,* B.

References.—*Stewart, Pb. Pl., 234; Balfour, Cyclop., I., 1052.*

Habitat.—A handsome herbaceous plant, with close spikes of white flowers and linear radial leaves, found on the Panjáb Himálaya between 6,000 and 9,000 feet.

FOOD. 274 Food.—"The leaves when young are much eaten, both fresh and dry, cooked as vegetables" (*Dr. Stewart*).

DOMESTIC. 275 Domestic Use.—Dr. Aitchison, in his Report on the Botany of the Afghán Delimitation Commission, draws attention to an interesting economic product derived from Eremurus Aucherianus, *Boiss., var.* Korolkowi. Its long fleshy roots are dried and ground into powder, which forms into a jelly with boiling water. This jelly is then hardened into variously-shaped vessels called *dabba*, used for holding oil and clarified butter. There is a large trade in this material in Khorásan, and Dr. Aitchison believes that the introduction of these vessels into India would be much appreciated by the *Hindú* community as a substitute for the animal skins at present employed in the oil and *ghí* trade. It is not known if any of the Indian species could be similarly used.

Ergot or Ergota; see Claviceps purpurea, Vol. II., 359.

Eria, see Silk.

ERIGERON, *Linn.; Gen. Pl., II., 279.*

276 **Erigeron asteroides,** *Roxb.; Fl. Br. Ind., III., 254;* COMPOSITÆ.

Vern.—*Maredi, sonsali,* BOMB.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 603; Dymock, Mat. Med. W. Ind., 429.*

Habitat.—A coarse, hairy annual, 1-2 feet high, found in Bengal and the Western Peninsula, and up to 4,000 feet on the Eastern Himálaya.

Medicine.—Dr. Dymock states that this HERB, together with other simples, is brought for sale into the Bombay bazar from Guzerat as a stimulating and diuretic medicine.

MEDICINE. 277

ERINOCARPUS, *Nimmo; Gen. Pl., I., 234*

Erinocarpus Nimmoanus, *Grah.; Fl. Br. Ind., I. 394;* TILIACEÆ. 278

Vern.—*Chera, chira,* BOMB; *Chowra, jangli-bhendi, haladi, adavi,* KAN.

FIBRE. Bark. 279

TIMBER. 280

ERIOBOTRYA, *Lindl.; Gen. Pl., I., 627* (under Photinia).

Eriobotrya bengalensis, *Hook. f.; Fl. Br. Ind., II., 371;* ROSACEÆ. 281

Syn.—MESPILUS BENGALENSIS, *Roxb.*

Vern.—*Berkung,* LEPCHA.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 406; Voigt., Hort. Sub. Cal., 198; Kurz, For. Fl. Burm., I., 443; Gamble, Man. Timb., 167; Balfour, Cyclop., III., 206.*

Habitat.—A large tree found in the Eastern Himálaya and the Khásia Hills up to 4,000 feet; also in Chittagong and Burma.

Dye.—The BARK is said to be used in Nepál for dyeing scarlet.

DYE. Bark. 282

E. elliptica, *Lindl.; Fl. Br. Ind., II., 372.* 283

Syn.—MESPILUS CUILA, *Ham.*

Vern.—*Mihul, mya,* NEPAL; *Yelnyo,* LEPCHA.

References.—*Gamble, Man. Timb., 167; Don, Prod. Nep., 238.*

Habitat.—A moderate-sized evergreen tree of the Eastern Himálaya, from Nepál to the Mishmi Hills, altitude 6,500 to 8,000 feet.

Structure of the Wood.—Reddish-brown, compact, hard, apt to warp slightly; it is good but not used. Weight 58lb per cubic foot (*Gamble*).

TIMBER. 284

E. japonica, *Lindl.; Fl. Br. Ind., II., 372; Wight, Ic., t. 226.* 285

THE LOQUAT, OR JAPAN MEDLAR.

Vern.—*Lakote,* KAN.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 406; Voigt., Hort. Sub. Cal., 198; Brandis, For. Fl., 57[illegible]; Kurz, For. Fl. Burm., I., 44[illegible]; Gamble, Man. Timb., 167; Dals. & Gibs., Bomb. Fl., [illegible]; [illegible] Pb. and Sind P., 5[illegible]; Lisboa, [illegible]; Bomb., 155; Birdwood, Bomb. Pr., 15[illegible]; Balfour, Cyclop., [illegible]; Smith, Dic., 231; Treasury of Bot., I., 4[illegible]; [illegible]*

Habitat.—A handsome evergreen [illegible] from Japan. Extensively cultivated for its fruit.

Food.—The *Loquat* tree is well known in gardens, [illegible] in Northern India. By careful cultivation, [illegible] obtained. It is grown [illegible] method being preferred. The [illegible] season. There are two distinct varieties [illegible] apricot colour, the other [illegible] a few days later, but is less [illegible].

FOOD. 286

ERIOCHLOA, *H. B. & K.; Gen. Pl., III., 1[illegible]*

Eriochloa annulata, *Kunth; Duthie, [illegible]* [illegible]

Syn.—E. POLYSTACHYA, *H. B. & K.*; PASPALUM ANNULATUM, *Flügge.*

Habitat.—A quick-growing perennial grass, found on wet ground in many parts of the plains.

FODDER. 288

Fodder. Eaten by buffalos. In Australia it is said to afford fodder all the year round, and to be highly relished by stock.

ERIODENDRON, *DC.*; *Gen. Pl., I., 210.*

(*George Watt.*)

289

Eriodendron anfractuosum, *DC.*; *Fl. Br. Ind., I., 350*;

THE WHITE COTTON TREE; KAPOK FLOSS. [MALVACEÆ.

Syn.—BOMBAX PENTANDRUM, *Linn.*; B. ORIENTALE, *Spreng.*; CEIBA PENTANDRA, *Gærtn*; ERIODENDRON ORIENTALE, *Steud.*; E. RHEEDII, *Planch.*

Vern.—*Hattian, katan, safed-semal*, HIND.; *Shwet-simul*, BENG.; *Ilavam*, TAM.; *Búruga, pur, buraga-dunna*, TEL.; *Paniá, paniala*, MAL.; *Khatyin, safed-khatyin*, DUK.; *Katdvar*, KHANDESH; *Shamiula, safed-savara, sálmali, pandhari, savar*, MAR.; *Bili burga, bili-barlu*, KAN.; *Imbul*, SING. (*elavum, illaku*, TAM.; in CEYLON); *Thinbawle*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 513; Voigt., Hort. Sub. Cal., 105; Grah., Cat. Bomb. Pl., 17; Dalz. & Gibs., Bomb. Fl., 22; Wight & Arn., Prod., I., 61; Wight, Ic., t. 400; Griff., Not., IV., 533; Beddome, For. Sylv., XXX., and Anal. Gen., t. 4; Hamilton* (Gossypinus) *in Trans. Linn. Soc., XV., 126; Thwaites, Enum. Ceylon Pl., 28; Kurz, For. Fl. Burm., I., 131; Moodeen Sheriff, Supp. Pharm., 135; also* (*new work, proof sent to author*) *Mat. Med. South India; Gamble, Man. Timb., 42; Report on Ind. Fibres, Col. & Ind. Exhib. (1886), 63; Lisboa, U. Pl. Bomb., 155 and 229; Gray, Botany of Bombay in Gazetteer, XXV., 322; Baden Powell, Pb. Prod., 313; Murray, Pl. and Drugs of Sind, 54; Drury, U. Pl. Ind., 197; also Handbook Fl. Ind., I., 86; Cooke, Gums and Gum-resins, 34; Ainslie, Mat. Ind., II., 96; Balfour, Cyclopædia of India, I., 1053; O'Shaughnessy, Beng. Disp., 227; Dymock, Mat. Med. West Ind., 2nd Ed., 106; Rheede, Hort. Mal., III., t. 49, 51; Rumph., Amb., I., t. 80; Sir W. Elliot, Fl. Andh., 32.*

Habitat.—A tall tree with straight trunk, prickly when young; branches horizontal and whorled. Flowers dirty white and much smaller than those of **Bombax**, with staminal tube splitting into five portions, each with two anthers, instead of into many divisions, each with one anther, as in **Bombax**. According to the *Flora of British India* this tree occurs "in the forests throughout the hotter parts of India and Ceylon: distributed to South America, the West Indies, and Tropical Africa."

LOCALITIES where met with. 290

Although occasionally met with in most districts of India, in only a few localities is it reported to be fairly abundant. With the view of affording information as to the localities where an effort might be made to develop a trade in kapok fibre—the floss from the seeds of this plant—the following review of the official correspondence and writings of Indian authors may be given:—

BENGAL. 291

Of Bengal Roxburgh says: "On the Coromandel Coast, the Tamils plant the tree about their temples. In Bengal, where the winters are colder, the leaves drop off during the hot season. In February, when destitute of foliage, the blossoms appear, and soon afterwards the leaves; the seed ripens in May." The writer is not aware of having seen the tree in Bengal except as planted along road-sides and in gardens. Mr. Gamble does not mention any special locality, but remarks that it is "often planted."

N. W. P. 292

Dr. King, in a list of the plants of the North-West Provinces (printed in the *Gazetteer, Vol. IV., p. LXVIII.*), simply mentions it by name. In his *Forest Flora of North-West and Central India*, Sir D. Brandis makes no mention of the tree, and Dr. Stewart is also silent as to its occurrence in

PANJAB. 293

the Panjáb; but Mr. Baden Powell, in his *Panjáb Products*, mentions it

briefly without stating where it is met with. It would thus appear that as far as these Provinces are concerned, while the plant occurs occasionally under cultivation, there is little or no prospect of a trade being done in the fibre from the wild or naturalised plant. Of Coromandel it may be otherwise. Roxburgh appears to have found it fairly plentiful. Sir Walter Elliot speaks of it as met with in that region, and gives it the Telegu name of *Búruga.* Turning to Burma, Kurz remarks that it is "here and there cultivated in Pegu and Tenasserim, a single tree was c[illegible] the coast forests of South Andaman." Mr Baden [illegible] of the Burmese Teak [illegible] lower undulating hills [illegible] Terminalia, Dillenia, [illegible]

LOCALITIES where met with.

BURMA 294

[illegible] ...uld appear to be by no means [illegible] ...r of Forests, Northern Circle, says that, except as a [illegible] in a few isolated cases i[illegible] (Nilghiri District), he has not met with it in [illegible] Circle), it is reported to be [illegible] ...es of the Sheveroy Range, [illegible] ...n the Hosur taluk scattered trees are met with towards [illegible] lands From other districts in the South Circle it is reported that the tree is found chiefly in a cultivated state, especially near temples. In Tinnevelly it is found scattered about in the Ghát forests, and it is estimated that about three tons of cotton could be gathered yearly. In North Malabar the tree is found chiefly on the lower slopes of the Chenat Nair forests, but there only at scattered intervals, and it disappears further west and north where the rainfall is heavier. In Southern Malabar there is little trade in the silk cotton, such trade as there is being more often in the cotton of the Bombax malabaricum. Dr Shortt (*Indian Forester, III*, 236) alludes to it in a list of plants parts of which are eaten in times of famine [illegible] it the following names: *Elevam*, TAM., *Pur*, TEL.; and he [illegible] the seeds being roasted and eaten" [illegible] *Medica of* [illegible] from [illegible] ...lways found in [illegible] ...," he does not mention from what source [illegible] ...ual of Trichinopoly the tree is referred to in a list of the "More important fruit and timber trees found in the district." It is said to be the *ilavam* or [illegible] Tamil and the remark is made: "The seeds are embedded in [illegible] cushions, &c." In the Nellore [illegible] of the Principal Trees of the [illegible] ...aga. In the *Mysore Gazetteer* [illegible] ...wn in the Bangalore gardens. [illegible] Cameron gives it the Kanarese [illegible] E., in a Catalogue of the drugs [illegible] fruits of this plant as being [illegible] products of [illegible] Salem. [illegible] ...ons [illegible] It has been customary [illegible] is

MADRAS. 295

BOMBAY. 296

ERIODENDRON anfractuosum. The White Cotton Tree.

LOCALITIES where met with.

concerned, most abundant in the Deccan. A recent correspondence woul however, appear to throw doubt on this prevalent opinion. Mr. McGregc Conservator of Forests, Southern Circle, Bombay, in a letter on the su ject, wrote that **Eriodendron anfractuosum** "is said to occur in Kánai but its occurrence is doubtful." He gave it the names of *Pandha savar*, MAR., and *Bili barlu*, KAN. In the same correspondence the Co servator of the Northern Circle, Bombay, was asked for information i garding the tree, and Mr. A. T. Shuttleworth replied that "**Eriodendr anfractuosum**, though stated in some botanical publications to be a coi mon tree in the forests of the northern circle, is exceedingly rare, and Khandesh, where it is supposed to grow in large numbers, there is scarc ly a tree of the kind to be seen in the forests. Authors of works on t Forest Flora of Western India have evidently mistaken some other tree probably **Bombax malabaricum**—for the Kapok or white cotton tree."

It would thus appear that there is room for doubt as to the existen in Bombay of **Eriodendron** as an abundant tree, and much confusion a pears still to prevail in the identification of the kapok tree; popular write are apparently unable to recognise it from **Bombax**. The vernacul names now given to the kapok tree might easily enough be adaptatio from the names given to **Bombax**. The Sanskrit word *sálmali* is by sor writers given to the one, by others to the other. *Sálmali*-wood is pr scribed in the Institutes of Manu as that on which washermen shou wash clothes. No writer definitely affirms that **Eriodendron** is wil nearly all speak of it as cultivated, and it may be the case that India ca only hope to take part in the growing kapok trade after some years wh the tree has been still further cultivated, in some of the regions where it now successfully grown. It would, however, be undesirable to accept a final the present information; and as in a measure opposed to the opinioi expressed by Mr. McGregor and Mr. Shuttleworth it may be as well complete this brief review by quoting some of the passages in which it affirmed that **Eriodendron** is a fairly common tree in both the southei and northern divisions of Bombay. Lisboa (*Useful Plants of Bomba p. 195*) says: It is "a very common prickly tree with palmate leaves an dingy white flowers." There can be no mistake as to the plant thei meant; it is **Eriodendron** and not **Bombax**. Dalzell and Gibson also d scribe the tree in language which cannot be mistaken, and they add: " grows in Khandesh;" its native name being "*Shameula*." Dr. Gra in his essay on the "Botany of the Bombay Presidency" (*Gazettee XXV., 322*), says that "**Eriodendron** is another large tree" (he has ju been speaking of **Bombax**) "similarly distributed in this country." "It i known as the white silk-cotton tree." Of **Bombax** he says it "is commo in all the forests of the Presidency from Gujarat and Khandesh t Kánara." Turning now to the *Bombay Gazetteers* Mr. Talbot, in th Kánara volume, says that **Eriodendron anfractuosum** is the *Bile burlu* c the Konkan, and *pándhari sávar* of MAR.; he remarks that "the white cotton, though fairly large, does not grow to the same size as **Bomba: malabaricum**. The pods are gathered for their cotton." Of the Panc Mahá's it is stated that "the *Shamla*, **Eriodendron anfractuosum**," i similar in appearance to **Bombax malabricum**, the *Shimal* or *Shimar* "but differs in the flower," those of **Bombax** "a dull crimson and thos of **Eriodendron** a dirty white." The writer of the chapter on the Pancl Mahál forests thus made no mistake, and Mr. Talbot's reputation as a botanist warrants the most complete confidence being placed on his state ment that the tree occurs in Kánara. Of the Poona District it is stated "*Hattian*, **Eriodendron anfractuosum**, though not plentiful, is found ii the thicker forests on the western hills. The light and soft wood i:

wool
a gum
Of the
osum,
white
soft wood of no use, save for making toys or fancy articles The down round its seeds is used for stuffing pillows It is not common anywhere in Khandesh"

LOCALITIES where met with.

GUM 297

Gum —This gum is of a dark-red colour and almost opaque It is generally known as *hattian-ke-gond*, and by European writers is said to be one

is, however, said to be astringent and to be employed medicinally in

It is interesting to note that the name *kapok* (or *capock*) was known a hundred years ago, and that it is a Malayan and not a Dutch name as some writers have stated Only the other day a great advance was supposed to have been made by the discovery of the plant from which the Dutch fibre *kapok* was obtained This fibre was well known to Ainslie nearly a century ago, and it is worthy of remark that the word *kapok* bears a close resemblance to the *karpási* of the Sanskrit writers, and that the most general modern names for the plant *Hattian* and *Kattan* seem to be directly derived from the Arabic *Kattar*, both these classical names are, however, now stated to be synonyms for cotton (*Conf* with the

TAN Wood 298

FIBRE. Bark. 299

ash 95 per cent, loss by hydrolysis (one hour's boiling in solution 1 per cent Na_2O) 50 5 per cent, cellulo
7 5 per cent, and by acid purifica
were only 1—2 mm in length
disposing of the dark fibre of this
The barking of the trees should, if
ceeds from the fibre thus obtained would by no means compensate for the injury done to the tree as a source of floss. The *Kapok* or FLOSS from the

Floss. 300

FIBRE.

seeds is, however, according to the present demand, a fibre of great merit. The modern trade in it was created by the Dutch merchants, their supply being drawn from Java. It is used in upholstery, being too short a staple to be spun, and, indeed too brittle and elastic. But these are the very properties that commend the floss to the upholsterer. In cushions, mattresses, &c., its elasticity and harshness prevent its becoming matted as is the case with *simal* floss, and it is, therefore, considerably superior to that fibre. Indeed, it is probable that the even still shorter staple of **Cochlospermum** would in time command a better price than that of the *simal*. Like *Kapok* it is very elastic, the fibre springing up to its former position the moment the weight is removed from the cushion. With *simal*, on the other hand, a very short time suffices to make a mattress assume permanently a compressed condition, in which it occupies perhaps less than half its original bulk and at the same time becomes knotted. This necessitates the removal of the stuffing to be teased or rudely carded.

It will thus be seen that if future extended usage of *Kapok* confirms the properties attributed to it, the demand for the fibre will year by year increase. But while endeavouring to participate in this trade it becomes essentially necessary that an error made by many writers be guarded against, namely, that of viewing *Kapok* as a generic trade-name for all the silk-cottons—including that of the *simal*—the floss of **Bombax malabaricum**. When the demand for *Kapok* first started, Indian exporters placed in the market a quantity of very dirty *simal*, having a large percentage of dust as well as seed. This was at once condemned, and fetched a price that would not even cover the transport charges. India thus fell into an inferior position which it is possible might never have been the case had carefully-cleaned *simal* been sent to Europe. A low-priced fibre like that of either *Simal* or *Kapok* cannot bear the extra freight of a large percentage of dust. It becomes essentially necessary that the floss be cleaned, freed of seed, and carefully baled. At the Colonial and Indian Exhibition, a large assortment of *simal* floss was shown, and the writer had the opportunity of conversing with several Dutch and English dealers in *Kapok*. These gentlemen assorted the *simal* samples and pointed to the fact that even among these there were inferior and superior qualities. Some had twice as long a staple as others, while the *Kapok* property of elasticity was possessed by but few. After this had been done Mr. Cherry's true *Kapok* floss was shown, when in every case the experts recognised it as *Kapok* and were eager to know the price, amount available annually, and the names of merchants with whom they might open up dealings. Unfortunately these were points regarding which no information could be furnished.

The necessity for care in future efforts may be apparent when it is here stated that nearly every trade journal which has published notices regarding *Kapok* has viewed it as one and the same thing with *simal*. Thus the *Indian Agriculturist* (October 16th, 1886) says that every person in India is familiar with "the value of the 'tree-cotton,' as stuffing for pillows and bedding, and *Kapok*, which is really the Malayan name for it, is the designation by which it is known in the Dutch and Australian markets, &c., &c." The writer of that article was apparently very liberally compiling from a paper which appeared in *Buchanan's Monthly Register* (Melbourne, June 21st, 1886), in which the tree-cotton—**Bombax malabaricum**—is incidentally mentioned along with **Cochlospermum Gossypium** and the *Baobab* tree of Africa as "in their growth and products" possessing "very little difference." Indeed, it seems probable that, as far as the Australian trade in Kapok from India is concerned, the floss of **Bombax**

FIBRE.

malabaricum is that which is so designated. While that may be so, the necessity for distinguishing the two fibres none the less remains in its full force, and the above reference to the *Indian Agriculturist* has been made

continuance of

by the Govern-

sking the name

"also whether

the exports of the tree cotton obtained from the Bombax or Eriodendron trees are the larger." The reply may be here published, as it is highly instructive :—

"BRITISH CONSULATE, "BATAVIA;

"*10th November 1887.*

"I have the honour to acknowledge receipt of your letter No 214—24-1 F. & S. of the 29th September last, and, in reply thereto, I beg to inform you that the scientific name of the tree from which Kapok is chiefly obtained in Java is Eriodendron anfractuosum. The exports of Kapok from the Netherlands India have been as follows :—

	Kilos.		Kilos.
1882	302,201	1884	426,061
1883	341,136	1885	600,269"

OIL. Seeds. 301

MEDICINE. Gum. 302 Floss. 303

Fruits. 304

other. The fruits of Eriodendron are always round, not angled, and somewhat larger and of a darker colour; the fruit-stalk of the Eriodendron,

MEDICINE.

however, is round, about the thickness of a pin, and two or three times longer than the fruit." These unripe fruits are regarded as demulcent and astringent. The exact original use of the expression *Maniti-Moggu* is not quite clear—*Moggu* means buds. The ROOTS are also used medicinally, being one of the forms of *Mádi* or *Múdi-sámul* (described under Bombax malabaricum, Vol. I., No. B. 653). Dr. Dymock explains that in the Concan the young roots of Eriodendron are preferred to those of Bombax. "They are dried in the shade, powdered and mixed with the juice of the fresh bark and sugar. This tree is called *Pándhra Saur* in Marathi and *Dí Sávrí* in Guzerathi" (*Mat. Med. West. India, 2nd Ed., 106*). The LEAVES and also the SEEDS have medicinal virtues attributed to them, but they do not seem of sufficient merit to deserve separate description.

Roots, 304 a. Leaves 304 b. Seeds, 304 c.

SPECIAL OPINIONS.—§ "A handful of the tender leaves of this plant is ground into a paste and is administered to a patient newly attacked with gonorrhœa. One dose at 6 A.M. is given daily for three or four days, and a little butter-milk is taken with it" (*Surgeon W. F. Thomas, Madras Army, Mangalore*). "The gum is also used in the incontinence of urine of children" (*Surgeon-Major J. J. L. Button, M.D., M.C., Salem*). "The root of the young plant is used in the form of decoction in cases of chronic dysentery and diarrhœa, also in cases of ascites and anasarca when it acts as a diuretic" (*Civil Surgeon J. H. Thornton, B.A., M.B., Monghyr*).

FOOD. Seeds. 305 Fruits 306 FODDER. Seed-cake 307 CHEMISTRY. 308

Food.—The SEEDS are said to be eaten, and the young or unripe FRUITS are also stated to be used in cookery. The seed-cake is sometimes given as FODDER. **Dr. Warden** has kindly furnished the following note on this subject showing the comparative composition of Kapok to Cotton-seeds:—

§ "The seeds of the Kapok tree have been made into cakes, and the comparative value of these cakes and ordinary cotton-seed cake for cattle-feeding purposes has formed the subject of an enquiry by **Mr. G. Reinders.** The following analytical results were obtained:—

	Kapok cake.	Cotton cake.
Water	13·28	12·0
Nitrogenous matter; albuminous compounds	26·31	20·62
Fat	5·82	6·36
Non-nitrogenous extraction	19·92	35·42
Woody fibre	28·12	20·36
Ash	6·52	5·64

"The ash of the Kapok-tree seed contains 28·5 % of phosphoric acid and 24·0 % of potash; it ought, therefore, to be of value as a manure."

TIMBER. 309

Structure of the Wood.—Soft, very light; 30lb per cubic foot. According to some writers this is the *Salmali* of Sanskrit writers. It is used for toys and other such purposes, and is sometimes hollowed out into canoes. (*J. F. Duthie.*)

ERIOGLOSSUM, *Blume; Gen. Pl., I., 396.*

[*I. 73;* SAPINDACEÆ.

310

Erioglossum edule, *Bl.; Fl. Br. Ind., I., 672; Beddome, Fl. Sylv.,*

Syn.—E. RUBIGINOSUM, *Bl.;* SAPINDUS RUBIGINOSA, *Bl.*

Vern.—*Ritha,* HIND.; *Mukta-meya,* URIYA; *Manipangam,* TAM.; *Isakardsi, undurugu,* TEL.; *Tseikchay,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 332; Voigt, Hort. Sub. Cal., 94; Brandis, For. Fl., 108; Kurz, For. Fl. Burm., I. 296; Gamble, Man. Timb., 94; Grah., Cat. Bomb. Pl., 29; Dalz. & Gibs., Bomb. Fl. Suppl., 12; Elliot, Fl. Andhr., 71, 186; Drury, U. Pl., 385; Lisboa, U. Pl. Bomb., 52; Royle, Ill. Him. Bot., 138; Balfour, Cyclop., III., 531; Treasury of Bot., 463.*

Habitat.—A large tree of Sikkim, Assam, South India, and Burma.

Structure of the Wood.—Strong and durable, with chocolate-coloured heartwood (*Roxburgh*). TIMBER 311

ERIOLÆNA, *DC; Gen Pl., 220*

Eriolæna Candollei, *Wall, Fl Br Ind, I, 370*, STERCULIACEÆ. 312

Vern —*Bute*, BOMB, *Dwani*, BURM

References —*Voigt, Hort Sub Cal, 108; Kurz, For Fl Burm, I, 148, Gamble, Man Timb, 51, Dalz & Gibs, Bomb Fl, 24, Lisboa, U Pl Bomb, 24, Burm Gas 127*

Habitat —A deciduous tree, found in the Western Peninsula, in Bhutan and in Burma

Structure of the Wood —Heartwood brick-red, with orange and brown streaks, old pieces, however, losing their bright colour, hard, close grained, shining, takes a beautiful polish, seasons well. Weight about 50lb per cubic foot. TIMBER 313

It is used for gunstocks, carpentry, paddles, and rice-pounders, is very handsomely marked, and is well worthy of greater attention

E. Hookeriana, *W. & A; Fl Br Ind, I, 370* 314

Vern —*Bündun*, [illegible] (S P), *Kutki*, [illegible] *orang*, BOMB, [illegible]

References —*Bra*[illegible] *Man Timb, 5*[illegible]

[illegible] the [illegible] were [illegible] the [illegible] d by [illegible] the

FIBRE Bark. 315 TIMBER 316

E. quinquelocularis, *Wight; Fl Br. Ind, I, 371; Wight, Ic, t 882* 317

Vern —*Budjari-dha mun*, BOMB

References —*Beddome, For Man, 35, Gamble, Man Timb, 50, Lisboa* [illegible]

[illegible] ing [illegible] wid [illegible] in [illegible]

Structure of the Wood —Said to be strong, and to be used by the natives for various purposes TIMBER. 318

E. [illegible]

[illegible] Kumaon [illegible]

Fibre —The BARK yields a good fibre FIBRE Bark. 319

Structure of the Wood —Heartwood hard and close-grained, reddish, mottled TIMBER. 320

E. Wallichii, *DC.; Fl Br Ind, I., 370* 321

Vern —*Kubin le*, NEPAL.

References —*Voigt, Hort Sub Cal, 108; Gamble, Man Timb, 50*

TIMBER. 322

Habitat.—A small tree of Nepál and the Sikkim Himálaya.

Structure of the Wood.—Sapwood grey; heartwood reddish-brown, hard, mottled; much esteemed by Nepalese.

ERIOPHORUM, *Linn.; Gen. Pl., III., 1052.*

323

Eriophorum comosum, *Wall.*; CYPERACEÆ.

Syn.—ERIOPHORUM CANNABINUM, *Royle*; SCRIPUS COMOSUS, *Roxb.*

Vern.—*Bábar, bab, babila, bhabhur, bhabhuri,* N.-W. P.; *Pan-babiyo* (Almora), KUMAON.

References.—*Atkinson, Him. Dist., 808; Royle, Ill. Him. Bot., 415; Royle, Fib. Pl., 34; Huddleston, Trans. Agri. Hort. Soc. Ind., VII., 272; Balfour, Cyclop., I., 1053; Ind. For., IV., 168; IX., 569; Linn. Soc. Jour., XX., 409.*

Habitat.—A coarse sedge-like perennial herb, the heads of flowers clothed with long silky hairs. Common in the Siwaliks and outer Himálayan ranges. Allied to the *Cotton grasses* of Europe.

FIBRE. 324

Fibre.—The fibre yielded by this plant forms a very small portion of what is exported to the plains under the name of *bhábar*. This latter is the produce of a grass named **Ischœmum angustifolium.** The **Eriophorum** fibre is utilised locally, but it is often difficult to discover whether it is pure or mixed with **Ischœmum.** Former writers are in error who have attributed *Bhábar* entirely to **Eriophorum.**

Captain Huddleston, in *Trans. Agri.-Hort. Soc. Ind., l.c.,* mentions that "All the *jhoolas* or rope bridges, which are erected over the large rivers, where *sanghas* or wooden planked bridges cannot be made, on all the principal thoroughfares of this district, are constructed of this silky species of grass, the cables of which are of a considerable thickness. This grass grows abundantly in all the ravines up the sides of the mountains, and is to be had only for the cutting, but it is not of a very durable nature, though pretty strong when fresh made into ropes. It lasts about a twelvemonth only, or a little more, and the people in charge of the rope bridges are constantly employed in repairing and annually renewing the ropes and stays. The '*chinkas*' or temporary bridges of a single cable, upon which traverses a seat in the shape of an ox-yoke, are also sometimes made of this grass." For further information regarding *bábar* grass, see **Ischœmum angustifolium.**

ERIOSEMA, *DC.; Gen. Pl., I., 543.*

325

Eriosema chinense, *Vogel; Fl. Br. Ind., II., 219;* LEGUMINOSÆ.

Vern.—*Konden,* SANTAL.

Reference.—*Rev. A. Campbell, Cat. Econ. Pl. of Chutia Nagpur, 64.*

Habitat.—A perennial herb with tuberous root, common on the Central and Eastern Himálaya, ascending to 6,000 feet. Recorded as occurring also in Chutia Nagpur, Burma, and Ceylon.

FOOD. 326

Food.—The Rev. A. Campbell states that the root is about the size of a marble, and is eaten by the Santáls.

ERUCA, *Tourn.; Gen. Pl., I., 84.*

327

Eruca sativa, *Lam.; Fl. Br. Ind., I., 158;* CRUCIFERÆ.

Syn.—BRASSICA ERUCA, *Linn*; B. ERUCOIDES, *Roxb.*

Vern.—*Taramira,* HIND.; *Suffed-shorshi, shwet-sursha,* BENG.; *Duan, sahwan, tira, tara, taramira, lalu,* N.-W. P. & OUDH; *Dua, chara,* KUMAON; *Tara, assu, usan, jamnia,* PB.; *Mandao,* AFG.; *Jambho,* SIND; *Siddartha,* SANS.; *Jambeh,* PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 497; Voigt, Hort. Sub. Cal., 72; Stewart, Pb. Pl., 11; Aitchison, Cat. Pb. and Sind Pl., 7; Murray, Pl.*

Taramira—Eruca Sativa (J F Duthie)

ERVUM Lens.

and Drugs, Sind 50 Atkinson Him Dist, 708 Econ Prod, N W Prov, Part V, 39, Duthie & Fuller, Field and Garden Crops, Part II 26; Baden Powell, Pb Prod, 419, Balfour, Cyclop, I, 441; Oudh Gaz, I, 498

said to be a cultivated as the *Flora of* rn Himálaya

CULTIVATION.

CULTIVATION. N W P. 328

North-Western Provinces—"Its cultivation is most general in the western portions of the Provinces It is most commonly grown mixed barley known as lls in wheat fields too dry for the *is very frequently* scattered over the ground before the

cotton on between 300 to 400 acres, and in the Jhansi and Benares Divi-

acre varies from 4 to 12 maunds (*Duthie & Fuller, Field and Garden Crops, II., 26*) Mr E T. Atkinson says that about Almora *it comes up* accidentally with the other species of mustard, but is also sparsely cultivated both in the hills and plains along the edges of corn fields.

PANJAB. 329

Panjab—In 1882-83 the total area under this crop was given as 210,000 acres, in 1883-84 it was 253,000 acres, and in 1884 85 it increased to 256,000 acres When grown with peas or gram it is intended for fodder. In the Jhelum District it is not unfrequently sown into a poor *bajra* crop.

OIL. Seeds 330

FOOD 331

Food—Stewart remarks that "the young plant is used as greens, as in France." The oil is sometimes employed in the preparation of sweetmeats

FODDER. 332

Fodder.—*Usun* is largely grown in the Panjáb, to be used as green fodder for cattle, camels, and goats In some districts it is cultivated during the hot weather, and given mixed with bruised barley, as a cooling food to buffaloes According to Dr Stocks "the oilcake is universally used for oxen, camels, goats, and sheep"

Conf. with account of Brassica, Vol I, pp. 520-534.

Ervalenta, see Lens esculenta, *Mœnch*

Ervum Lens, *Linn*; see Lens esculenta, *Mœnch*.

ERYCIBE, *Roxb.; Gen. Pl., II., 868.*

333

Erycibe paniculata, *Roxb.; Fl. Br. Ind., IV., 180;* CONVOLVULACEÆ.

Vern.—*Urumin,* KOL; *Kari,* SANTAL; *Atta-meeriya,* SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 197; Voigt., Hort. Sub. Cal., 441; Brandis, For. Fl., 344; Kurz, For. Fl. Burm., II., 214; Gamble, Man. Timb., 273; Thwaites, En. Ceylon Pl., 213; Dalz. & Gibs., Bomb. Fl., 169; Rheede, Hort. Mal., VII., 73, t. 39; Journ. As. Soc., Pt. 2, No. 2, 1867, 80; For. Adm. Report, Ch. Nagpur, 1885, 32.*

Habitat.—A diffuse or sub-scandent shrub, or an erect tree, 40 feet high, found throughout India from Oudh eastward, and southward to Ceylon, Tenasserim, and the Nicobars.

MEDICINE Bark. 334

Medicine.—The Rev. A. Campbell mentions that in Chutia Nagpur the BARK is given for cholera.

ERYNGIUM, *Linn.; Gen. Pl., I., 878.*

335

Eryngium cœruleum, *Bieb.; Fl. Br. Ind., II., 669;* UMBELLIFERÆ.

Syn.—ERYNGIUM PLANUM, *Lindl.,* in *Royle Ill., 232* (not of *Linn.*)

Vern.—*Dhudhali,* HIND.; *Poli, mittúa, kandú, pahari gájar, núrálam,* PB.; *Shakakul-misri,* ARAB.; *Gurs-dusti,* PERS.

References.—*Stewart, Pb. Pl., 105; Aitchison, Cat. Pb. and Sind Pl., 67; Royle, Ill. Him. Bot., 232.*

Habitat.—A glabrous, perennial herb, with spinescent glaucous leaves, found wild in Kashmír up to 6,000 feet.

MEDICINE. Root. 336 Seeds. 337

Medicine.—The ROOT is considered to be aphrodisiac and to act as a nervine tonic. In Kandahar the SEEDS are said to be officinal.

SPECIAL OPINION.—§"The root is much used on account of its supposed aphrodisiac properties" (*Civil Surgeon J. Anderson, M.B., Bijnor*).

ERYTHRÆA, *L. C. Rich.; Gen. Pl., II., 809.*

338

Erythræa Roxburghii, *G. Don.; Fl. Br. Ind., IV., 102; Wight, Ic., t. 1325;* GENTIANACEÆ.

Syn.—CHIRONIA CENTAURIOIDES, *Roxb.*

Vern.—*Charáyatah,* HIND.; *Girmi, gima,* BENG.; *Gada-sigrik,* SANTAL; *Luntak, kurúnai, kadavi-nai,* BOMB.; *Jangli kariátu,* GUZ.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 196; Dalz. & Gibs., Bomb. Fl., 157; Pharm. Ind., 150; O'Shaughnessy, Beng. Dispens., 461; Moodeen Sheriff, Supp. Pharm. Ind., 99; Dymock, Mat. Med. W. Ind., 2nd Ed., 541; S. Arjun, Bomb. Drugs, 90; Drury U. Pl., 198; Lisboa, U. Pl. Bomb., 262.*

Habitat.—A slender annual with rose-coloured flowers, found throughout India, ascending to 2,000 feet, from the Panjáb and Bengal to Travancore.

MEDICINE. 339

Medicine.—The whole plant is powerfully bitter, and may be substituted for chiretta, when the latter is not available. According to Rev. A. Campbell it is used by the Santáls in fever.

ERYTHRINA, *Linn.; Gen. Pl., 531.*

The Erythrinas are mostly trees or shrubs, rarely herbs. They are chiefly remarkable for their brilliantly coloured red flowers, which are usually produced before the new leaves are developed.

340

Erythrina arborescens, *Roxb.; Fl. Br. Ind., II., 190;* LEGUMINOSÆ.

Vern.—*Dingsong,* KHASIA; *Rodinga, fullidha,* NEPAL; *Gyesa,* LEPCHA; *Rungara,* KUMAON.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 544; Voigt., Hort. Sub. Cal., 237; Brandis, For. Fl., 140; Gamble, Man. Timb., 122; Balfour, Cyclop., I., 1054.*

Habitat —A small or moderate-sized tree, found in the outer Himalaya from the Ganges to Bhután up to 7,000 feet, and in the Khásia Hills

TIMBER 341

Structure of the Wood —Similar to that of E suberosa and indica, but is more compact, less spongy, and has more numerous concentric bands of soft texture.

342

Erythrina indica, *Lam ; Fl Br Ind, II, 188, Wight, Ic, t 58*

INDIAN CORAL-TREE, MOCHI WOOD

Ve— ... mandara, HIND, ...

Palitmandar, SANS

References —*Roxb Fl Ind, Ed C B C, 541, Voigt, Hort Sub Cal, 237, Brandis, For Fl, 139, Kurz, For Fl Burm, I, 368, Beddome Fl Sylv, 87, Gamble, Man Timb, 122, Dalz & Gibs Bomb Fl, 70, Rheede, Hort Mal, VI, t 7, Elliot, Fl Andhr, 19 20, 23, 110, U C Dutt, Mat Med Hind, 308, Budie, Cat Raw Pr, Paris Exh, 52, Irvine, Mat Med, Patna, 89, Lisboa, U Pl Bomb, 59, Birdwood, Bomb Pr, 329, Cooke, Gums and Gum resins 17, McCann,* ... *Paper making* ... *esinous Prod* ... *h, Dic, 132,* ... *Ec Bot, 43,*

Habitat —A moderate-sized, quick-growing tree with straight trunk, which is usually armed with prickles when young It occurs throughout India from the foot of the Himálayas and in Burma Often grown in gardens.

GUM. 343

DYE & TAN Flowers 344

Bark 345

FIBRE Bark. 346

MEDICINE Bark. 347

Juice 348

Leaves 349

FOOD. Leaves. 350

Food —The tender LEAVES are eaten in curry

FODDER. Leaves. 351

Fodder —The LEAVES are used as cattle fodder in the Trichinopoly District

TIMBER 352

Structure of the Wood —Rather durable, though light and open-grained, it does not warp or split, and takes a good varnish. Structure the same as that of E suberosa.

It is used for light boxes, toys, scabbards, trays, as well as for fre-

wood. Carpenters prefer it to all others for the poles of palanquins. According to Brandis it is used for much of the lacquered-ware of different parts of India. In Madras it is known as *mochi* wood, and according to Wight is generally employed for constructing catamarans.

DOMESTIC. 353

Domestic Uses.—It is said to be largely planted in Bengal and South India to support and shelter the betel and black pepper vine. It is also used for hedges.

354

Erythrina stricta, *Roxb.; Fl. Br. Ind., II., 189.*

Vern.—*Fallcto, fullidha*, NEPAL; *Mouricon, kichige*, KAN.; *Taung kathit*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 542; Voigt., Hort. Sub. Cal., 237; Kurz, For. Fl. Burm., I., 369; Beddome, Fl. Sylv., t. 175; Gamble, Man. Timb., 122; Dalz. & Gibs., Bomb. Fl., 70; Balfour, Cyclop., I., 1055; Ind. For., XIV., 391.*

Habitat.—A large tree with pale-coloured prickles when young; is found in Burma and the western half of the Peninsula.

TIMBER. 355

Structure of the Wood.—Soft, resembling that of **E. suberosa**; it is sometimes used for planks.

356

E. suberosa, *Roxb.; Fl. Br. Ind., II., 189.*

Vern.—*Pangra, dauldhák, rúngra, rowanra, nasút, madára*, HIND.; *Farhad*, KHARWAR; *Mandal*, GARO; *Fullidha*, NEPAL; *Katiang*, LEPCHA; *Phangera*, GOND; *Gúlnashtar, pariára, thab*, PB.; *Gada-phassa*, KURKU; *Nangthada*, MELGHAT; *Pangra*, KON.; *Pángára*, DEC.; *Mandal*, GARO.; *Muni, maduga*, TAM.; *Mulu modugu, badadam* (*var.* sublobata), TEL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 543; Voigt., Hort. Sub. Cal., 237; Brandis, For. Fl. 140; Kurz, For. Fl. Burm., I., 369; Beddome, For. Man., 87; Gamble, Man. Timb., 121; Grah., Cat. Bomb. Pl.. 54; Dalz. & Gibs., Bomb. Fl., 70; Aitchison, Cat. Pb. and Sind Pl., 47; Elliot, Fl. Andhr., 19, 119 (var.* sublobata); *Atkinson, Him. Dist., 309; Balfour, Cyclop., I., 1055; Raj. Gaz., 35; Bomb. Gaz., XV., 68.*

Habitat.—A moderate-sized deciduous tree of the Himálaya from the Ravi to Bhután, up to 3,000 feet, and extending to Central and South India and Burma. **E. sublobata**, *Roxb.*, is only a variety with larger and lobed leaflets.

TIMBER. 357

Structure of the Wood.—Very soft, spongy, white, fibrous but tough; darker-coloured near the centre, but no regular heartwood. It is used for scabbards, sieve-frames, and occasionally for planking.

(*J. Murray.*)

ERYTHROXYLON, *Linn.; Gen. Pl., I., 244.*

A genus of shrubs or trees containing about 50 species, natives of warm countries—10 in Africa, 6 in India and Ceylon, 1 in Australia, and the rest in America. The generic name has been given in allusion to the red-sandal-like wood which the majority possess.

358

Erythroxylon Coca, *Lam., Bent. & Trim.; Med. Pl.. t. 40*; LINEÆ.

References.—*DC. Origin Cult. Pl., 135; U. S. Dispens., 15th Ed., 563; Bent. & Trim., Med. Pl., 40; Warden, Prof., Chemistry, Calcutta,—Note on Erythroxylon Coca as grown in India; Agri.-Hort. Soc. Jour., VIII. Pt. II. (new series), 1888, pp. 127—170; Kew Bulletin, January 1889; Christy, Com. Pl. and Drugs, No. 3, 24, No. 4, 43, No. 5, 55, No. 6, 85, No. 7, 45, No. 8, 47, No. 9, 62; Spons, Encyclop., 1307; Balfour, Cyclop., 1055; Treasury of Bot., 469; Weddel, Voyage dans le Nord de Bolivie (Paris, 1853); Johnstone, Chem. of Common Life, Ed. Church, 357; Watts, Dic. of Chem. I., 1059; Gosse, Monographie de l' Erythroxylon Coca (1861); Christison, Brit. Med. Journ., April 29, 1876; Crockman in Journal Pharm. Society, April 23rd, 1887; Dowdeswell, in Lancet, April 29, 1876, and May 6, p. 664; Bidie, Pamphlet on Erythroxylon Coca,*

Madras, March 1885, Rusby "The Cultivation of Coca," Therapeutic Gazette, January 1886.

Habitat.—A shrub, 2 to 6 feet high, much branched, somewhat resembling the black thorn.

It is found in Peru, Bolivia, Brazil, the Argentine Republic, and other parts of South America, growing from 2,000 to 8,000 feet above the sea-level, but according to De Candolle the plant is indigenous only to the two former countries. It is an escape from cultivation as generally met ... India ... nuary,

An intermediate form is provisionally adopted as exhibiting the general charact ... variety ... Ceylon ... India e ... intermediate form, the Bolivian Coca.

HISTORY, 359

History.—The name *Coca*, sometimes called *Cuca*, is a corruption of the Aymara Indian word *Khoka*, signifying "plant," *the* plant *par excellence*. The natives of Peru have utilized this bush from the earliest period, and its employment was general at the time of the conquest of that country by Spain. From Peru (and, according to De Candolle from Bolivia also,) it seems to have spread over the other parts of South America, where the cultivated plant is now to be found in all localities, the natural conditions of

INTRODUCTION. 360

the wonderful *sustaining* effects of which were beginning to be recognised in Europe, would rapidly become an important article of commerce. No steps of any importance, however, seem to have been taken till 1885, when, owing to the discovery of the value of *Cocaine* as an *anæsthetic*, the demand in Europe for the Coca leaf was rapidly increased. As a

left nothing to be added.

Owing most probably to the great increase in exportation of the plant

HISTORY.

from South America, and its consequent cheapening in the European markets, Coca cultivation in India has not materially developed since its introduction. Indeed, of the tea districts of Ceylon, Madras, Mysore, and Bengal, it may practically be said that it is now, as it was three years ago, grown only experimentally.

CULTIVATION.

CULTIVATION 361

Method followed at the source of supply.—The *Tropical Agriculturist* of November 1885 publishes an account taken from *The Ephemeris*, of which the following may be given as the substance :—

Coca is grown on terraces on the sides of deep narrow valleys, between the heights of 3,000 and 6,000 feet. In August the seeds are sown in boxes or beds, and in June they are transplanted to the hill terraces and deposited about three feet apart. The soil must be rich in vegetable manure, and free from weeds; the crop, in other words, is an exhausting one, necessitating virgin soil. In consequence a forest clearing is generally chosen, the ground being already rich in decayed vegetable matter.

Dr. Warden, in his note on "*Erythroxylon Coca grown in India*" writes :—

"From a high altitude, the best results as to total alkaloids have been yielded by plants grown on a hill-side soil rich in vegetable manure. But a rivalry exists between this variety of soil and a yellow clay. The author is inclined to think that those who prefer the latter soil do so because it yields a somewhat larger crop.

"The ground for the nursery beds is prepared during the latter part of the dry season, by breaking it up very thoroughly to the depth of a foot or more. The plan of sowing the seeds broadcast as soon as gathered, and covering with a little earth, or better, a layer of banana leaves or decaying vegetable matter, has been found to answer. Germination requires from eight to twelve days longer than by adopting the native method, which consists in depositing the seeds, as soon as gathered, in a shaded place in layers an inch or more deep, and covered with a thin layer of decaying leaves. The heat generated by the decomposition of the fleshy pericarps seems to induce germination, and the embryo bursts its bony covering. This growth unites them in from eight to fourteen days into a solid mass which is broken up into small pieces and planted in furrows in the nursery. In this process very many of the sprouts are broken off and the plants destroyed. A covering of brush or straw must be placed over the nursery, at first only three or four inches above the surface, and elevated as the plants grow.

"On the manner in which the ground is prepared for the plantation much of the future well-being of the plant depends. The ground should be thoroughly powdered to the depth of two, or, if possible, three feet, and all roots and large stones removed. It is generally believed that shade tends to the production of the best quality of leaves, and the cocales are therefore planted thickly with a small broad-topped leguminous tree related to the St. John's head plant. The custom appears to have arisen from two considerations. There is a period, already referred to, of two or three months during which no rain falls; and then these trees afford protection from the sun. Secondly, because shade conduces to the production of a large smooth leaf of elegant colour and thus adds to the appearance of the product. From repeated comparative assays made by Rusby of shade and sun-grown leaves from adjoining plants, the sun-grown leaves were invariably much richer in total alkaloids.

"The plants are transplanted from the nursery at the advent of the permanent rains, and are set out from half an inch to three feet apart. They grow to a height of two to six feet, but the largest plants do not yield the

CULTIVATION.

best leaves Great care must be taken to keep the soil thoroughly stirred and free from weeds. (*Jour. Agri.-Hort. Soc., Vol. VIII., Pt. II., New Series, p. 149.*)"

Most American writers appear to hold that the plant is better cul-

to manure.

In India

In India.—The following interesting facts regarding the effects of

Jaunpore district the soil is stated to have been highly manured, but no particulars as to the precise nature of the fertiliser are afforded The leaf grown at Arcuttipore yielded very considerably more alkaloid than any of the other samples examined, while that grown in the Jaunpore district contained only ·571 per cent. of alkaloid. I have no information whether the Arcuttipore plants were grown in the shade or open. On the Jaunpore Tea Estate there appear to be four plants, two in full sun-shine and measuring 5½ feet and 5 feet 2 inches in height respectively, one in partial shade 3 feet high, and one in shade 5 feet high, and I gather from the Manager's letter that the leaf sent me was collected from the plant which grew in the shade.

"Taking into consideration the amount of potash contained in the leaves and the rapid exhaustion of the soil which would necessarily ensue from repeated plucking of the leaves, it appears to me that though at first a nitrogenous fertiliser would be beneficial, yet after a time the addition of a fertiliser containing potash in some form in addition to nitrogenous matter would be necessary. The amount of nitrogen in the soot or cow-dung might possibly suffice, but whether the amount of potash in the cow-dung would be sufficient to supply the place of that removed from the soil by the leaves is an open question" (*l. c. p. 153*).

From reports furnished at various times to the

case of its cultivation at lower altitudes in India,

abo

a co

spec... attention to weeding.

SPECIAL REPORTS.—The Conservator of Forests, Southern Circle, Madras, writes:—"This Circle has not got beyond the experimental stage. No regular areas have been planted. In Wynaad the planters have a few plants here and there, but apparently more as curiosities than anything else, and the Forest Department there has about one hundred plants. The District Forest Officer has observed that it seeds less freely in Wynaad than on the coast." The Deputy Conservator of Forests, Coorg, reports:—"Coca has only been cultivated in gardens in Coorg. Flowers and fruits in Mercara. It seems doubtful if its cultivation would pay."

MANUFACTURE. 362

COLLECTION AND MANUFACTURE.

In Peru and Bolivia two crops are gathered, the first, the "March

ERYTHROXYLON
Coca.

The Coca Plant.

COLLECTION AND MANUFACTURE.

crop," commences in January, the second, the "St. John's" crop, begins in May. The first picking of leaves is made one year and a half from the date of transplanting. During the first five years the percentage of the alkaloid, cocaine, yielded by the leaves increases rapidly, reaching its maximum about the tenth year. The plant retains its full productive power till about the twentieth, after which it slowly declines till about the fortieth year, probably owing to exhaustion of the soil.

The women and children collect the mature leaves, which are known by being bright green on the lower, and yellowish on the upper, surface. Each leaf is picked separately, and very carefully, and every precaution is taken not to touch the top of the bush. The leaves are then conveyed to the place of preparation, where they are laid out in a single layer on a pavement, kept scrupulously flat and clean, which has been previously heated by the sun. The necessity of the pavement being already hot is greatly insisted on. The leaves are stirred occasionally until dry, which they become in about three hours. They are then either placed for a short time in storage houses, where they undergo a slight sweating process, or are at once packed. The slightest amount of moisture is fatal to the leaf after being dried. The leaf should therefore always be packed in zinc, or tin-lined, air-tight boxes.

In India several methods of drying artificially, in tea driers or charcoal *chulas*, have been experimentally tried. According to **Dr. Warden** the results by all are equally good.

He writes:—"The object which should, I think, be kept prominently in view, is to dry the leaves as thoroughly and quickly as possible at the lowest temperature. The plan adopted at Arcuttipore of first withering the leaves in the shade, and then drying them in a tea drier at 150° Fh. for 10 minutes, appears to me as good as any. I do not think any advantage is to be gained by employing a higher temperature. In whatever way dried, the leaves should be at once packed in air-tight boxes directly they are cold."

MEDICINE.
Leaf.
363

Medicine.—From the earliest dates the Indians of Bolivia, Peru, and Brazil have ascribed marvellous properties to the LEAF of the **Coca** plant. Chewed, either alone or mixed with lime, or taken in various forms of syrup and decoction, the consumer is enabled to sustain the greatest fatigue and hardship, without either food or sleep, for a lengthened period. The drug is also said, especially when taken as an infusion or decoction, to prevent difficulty of respiration in ascending hills. Consumed in any form it produces a peculiar excitement, slow and sustained, and diffused generally over the nervous system, accompanied by a general feeling of well-being. When eaten along with tobacco it is reported to produce a condition of intoxication very similar to that caused by alcohol or Indian hemp. Prolonged or excessive use of the drug is followed by much the same results as over-indulgence in opium. The **Coca**-eater loses his appetite, suffers from impaired digestion, and, when not under its influence, becomes phlegmatic and apathetic. According to **Johnston** in his *Chemistry of Common Life* quoting **Von Tschudi**, "The inveterate Coquard (or Coca-eater) is known at the first glance. His unsteady gait, his yellow skin, his dim and sunken eyes, encircled by a purple ring, his quivering lips, and his general apathy, all bear evidence of the baneful effects of the Coca juice when taken in excess." **Von Tschudi**, however, states as the result of his inquiries, that "the moderate use of **Coca** is not merely innocuous, but that it may even be very conducive to health."

Dependent on these properties, the infusion of **Coca** is viewed as a valuable remedy in asthma and colic, and that the leaves applied externally as a plaster to cure boils and ulcers.

MEDICINE.

The Indians of Peru, probably influenced by their experience of the wonderful properties of the leaf, are said to regard it as sacred Its use is much intermingled with their religious rites, and to the plant itself worship is rendered

Since the introduction of the leaf into Europe, many writers have

thetic action of the alkaloid. It is now most extensively employed as a local anæsthetic in many minor operations, and is specially valuable in ophthalmic surgery, since it produces complete insensibility to pain in the superficial structures of the eye It is also mydriatic, and paralyses the accommodation *Cocaine* seems to act by paralysing the termination of the sensory nerves in any structure to which it is applied, but this paralysis remains purely local and does not last long. Indeed, this limitation of its action to the tissues to which it is directly applied, is the most valuable

and a *peculiar wax*

From recent researches, however, it would appear that the amorphous cocaine, formerly described, is in reality a solution of cocaine in the volatile oily body *hygrine* (*Stockman, Journal Pharm Society, April 23rd, 1887*). Regarding *ecgonin*, it appears that it also does not exist ready formed in the leaves, but is a product of the decomposition of Cocaine (*Dr Warden's note on Erythroxylon Coca grown in India—March 1888*) The further elucidation of this question is to be hoped for, as the cocaine of commerce at present seems to vary much in character, and a more exact knowledge of its true chemical nature is required to determine whether the amorphous substance often connected with the alkaloid and its salts, may not be the cause of the objectionable effects which sometimes follow its use. Excluding these doubtful substances, therefore, there remain to be considered the alkaloid cocaine, hygrine, coca-tannin, and the wax:—

Cocaine 365

E. 365

CHEMISTRY.

It has a bitterish taste, and crystallizes in small shining monoclinic prisms.

The pure alkaloid is much used in medicine, especially in the manufacture of oleates and ointments, for which it is more suitable than its salts, owing to its solubility in fats and oils. The amount of the alkaloid obtainable from the leaf of commerce is variously stated as from ·2 to ·5 per cent.

Hygrine. 366

2. HYGRINE—is described by **Wholer** and **Lossen** as "a pale yellow, volatile, oily body, giving the ordinary reactions of alkaloids, hygroscopic, and forming hygroscopic salts which crystallize with great difficulty."

Coca-tannin. 367

3. COCA-TANNIN—resembles the tannin of tea in giving a deep brownish green colour with the persalts of iron. It has been found to vary much in quantity in the different leaves examined in this country. **Dr. Warden** writes:—"It is of interest to note that the largest deposits of *coca-tannin* occurred in those samples which yielded the highest percentage of alkaloid. It appears to me, therefore, as not improbable that in the leaves the *cocaine* is in combination with the acid to which this term of *coca-tannin* has been applied."

Wax. 368

4. The WAX is unimportant.

Dr. Warden, in his paper above quoted, gives a number of very interesting analyses of leaves grown in different parts of India, from which it would appear, that the percentage of *cocaine* is higher than that recorded in any previously published assay. Those which yielded the best results were leaves from Ranchi, Arcuttipore, and from the Central Terai Tea Co. They contained an average percentage, on the anhydrous leaf, of over 1, the highest being 1·671. Though, as above noted, the physical character of the alkaloid obtained by **Dr. Warden** differs from that of the American leaf, it has been proved that it is equally efficacious as a local anæsthetic. **Dr. Saunders**, Professor of Ophthalmic Surgery at the Medical College, Calcutta, used a 4°/o solution in thirteen cases of operation for cataract and many minor operations, and found that it differed in no way from other *cocaine*, except that it appeared to have a quicker and slightly stronger action. Should **Warden's** analysis be confirmed that the cocaine of the Indian plant neither spontaneously crystallizes itself nor possesses spontaneously crystallizable salts, it might be objected to on purely pharmaceutical grounds; but it is to be remembered that the salts of the alkaloid are mainly used in solution.

TRADE. 369

Trade.—It has been clearly established that the climate and physical conditions of many parts of India are in every way suitable for the growth of **Coca**; but whether it will pay to cultivate the plant is another question.

According to **Squibb** in the *Ephemeris*, May 1887, the Peruvian Government records and taxes a production of 15,000,000lb per annum, and the Bolivian Government 7,500,000lb. Of the latter quantity 5°/o or 375,000lb is exported to the United States and Europe. Assuming that from the doubly great produce of Peru, twice the quantity above mentioned reaches the United States and Europe, an aggregate export of 1,125,000lb annually is arrived at. This amount of leaf, if manufactured, would yield from 2,000 to 3,000lb of cocaine. When it is remembered that the uses of **Coca** are very limited in Europe, that it is employed almost entirely as a medicine, and that there are no indications of **Coca** preparations coming into general use as a beverage, it seems very improbable that cultivation of the plant to any great extent would pay. Still, the Indian plant seems to be peculiarly rich in the alkaloid, and small quantities carefully prepared and packed would probably find a ready sale in Europe.

Recent returns give the price of the dried leaf at from 10*d.* to 1*s.* 6*d.* a pound.

370

Erythroxylon monogynum, *Roxb.; Fl. Br. Ind., I., 414; Beddome, Fl. Sylv., t. 81.*

BASTARD SANDAL OR RED CEDAR.

Syn.—E. INDICUM, *Beddome*, SETHIA INDICA, *DC.*

Vern. ... *deoa* ... nopc ... *Kat* ... Nii ... in m ... (Cuddapah), TEL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 386; Voigt, Hort. Sub. Cal.,* ... *Bangalore*

Habitat.—A shrub or small tree of the hilly tracts of the Western Peninsula; also met with in the Kurnool, Bellary, Cuddapah, Nellore, Chingleput, and North Arcot Districts of South India. It occurs plentifully in ...

... fodder, it is stated that the belief prevails that the plant is "well able to withstand drought, and evidently flourishes on the driest soils in the very hottest climates."

OIL. Wood. 371

...

Oudnatje, and his account of its preparation and uses has been reproduced in various works, such as *Cooke's Gums and Resins;* ...

MEDICINE. Leaves. 372

...

mens analysed by the Government Quinologist at Madras were found, ...

MEDICINE. Wood. 373 Bark. 374 Liniment. 375

WOOD being sold in Madras and used in slight cases of dyspepsia and continued fever, and also in some cases of dropsy. He says the wood has a strong aromatic and agreeable smell. Dr. Bidie mentions the powder as used medicinally as a substitute for sandal wood. The BARK is said by Dr. Shortt to be employed as a tonic in fever, being prepared as an infusion. The leaves when eaten as a vegetable are believed to possess refrigerant properties, and the pulp beaten into a LINIMENT with gingelly oil is used, as an external application to the head. (*Madras Agri.-Hort. Soc. Journal, IV., 41*). This statement, regarding the preparation of a liniment, was apparently first made by Ainslie (*Mat. Med. II., 421*) regarding the plant he calls E. areolatum, *Willd.*

FOOD. Leaves, 376 Fruit. 377 Famine Food. 378

Food.—Both in the various Madras accounts of this plant and in Mr. Lisboa's *Useful Plants of Bombay*, the LEAVES are said to be regularly eaten as a green vegetable. Of Madras it is reported that they are used in curries, and that in famine times they are boiled with rice, *rágí*, &c., to increase the volume of food. Mr. Lodge (*District Forest Officer, Cuddapah*) writes that, the plant yields a "small red juicy FRUIT with a refreshing taste, and a flavour somewhat resembling that of a cherry."

FODDER. Leaves. 379

Fodder.—The Government of Madras recently called for information as to the extent the LEAVES of this plant were used as fodder. The replies showed that they were "sometimes but rarely used in the Godavari, Cuddapah, and Anantapur districts." The Collector of Salem, however, reported that "no one recognises it as a fodder-plant, and that cattle have been seen to pass close to young succulent coppice shoots without touching them." The Madras report concludes, however, by saying that elsewhere, when other supplies fail, cattle, sheep, and goats eat the plant.

TIMBER. 380

Structure of the Wood.—Sapwood white; heartwood dark-brown, with a pleasant resinous smell; it is very hard, takes a beautiful polish, and is sometimes used as a substitute for sandalwood (Santalum album).

Esparto Grass. *See* Lygeum Spartum and Stipa tenacissima.

(*J. F. Duthie.*)

EUCALYPTUS, *L'Her.; Gen. Pl., I., 707.*

HISTORY. 381

The majority of the species, of which about 140 have been described, are confined to Australia and Tasmania, where they afford characteristic features in the scenery of those countries. A few occur in New Zealand, and in some of the islands of the Indian Archipelago.

Popularly known under the general name of 'gum trees,' they are locally distinguished in Australia by characters observable in the bark; which, in some of the species, is fibrous or stringy, in others hard and fissured, whilst sometimes it presents a smooth and polished surface, and occasionally it scales off in flakes. The botanical determination of the species is often difficult, owing to the close similarity of their floral structure, as well as to the various forms sometimes assumed by the foliage on different portions of the same tree, and at different periods of its life. This task has, however, been greatly lessened by the researches of the eminent local botanist, Baron von Mueller, brought to light in his very valuable illustrated monograph entitled "Eucalyptographia."

As trees they are chiefly remarkable for their rapid growth, and the enormous height to which some of the kinds attain; one specimen in Victoria, a fallen one, having been found to measure 480 feet in length; and specimens of E. obliqua (the String-bark) have been felled in Tasmania, the trunks of which measured 300 feet high and 100 feet in circumference.

The timber yielded by some kinds, notably that of E. Globulus (Blue gum), E. marginata (Jarrah or Mahagony of South-West Australia), and

HISTORY.

E. robusta (Red gum of South Australia), is extremely valuable on account of its strength and durability under water, and its immunity from attacks by white-ants.

An astringent substance resembling *kino* (a product of Pterocarpus Marsupium) is yielded by several of the species, and is used medicinally, as well as for tanning and dyeing.

A still more important product is Eucalyptus oil, which, through the exertions of Mr. J Bosisto of Melbourne, has recently been extensively brought into commerce, and is now being employed for various purposes. [illegible] ...s quanti- [illegible] me influ- [illegible] prevails, [illegible] thorough [illegible] ees. The [illegible] Plants,"

E. amygdalina	3 313	per cent. of volatile oil.
E. oleosa	1·250	" "
E. Leucoxylon	1·060	per cent of volatile oil.
E. goniocalyx	0·914	" "
E. Globulus	0·719	" "
E. obliqua	0 500	" "

Baron von Mueller then goes on to explain that the lesser quantity of oil of E. Globulus is compensated for by the vigour of its growth and the early copiousness of its foliage, and that the proportion of oil varies somewhat according to locality and season. "E. rostrata," he says, "though one of the poorest in oil, is nevertheless important for malaria-regions, as it will grow well on periodically-inundated places and even in stagnant waters not saline"

Though confined to the Australian continent and its neighbourhood, the various species of Eucalyptus are found to thrive under very different influences as regards climate and soil Some occur at elevations where snow [illegible] flourish best [illegible] in are more [illegible] or calcare- [illegible] countries [illegible] As regards [illegible] ve been ob- [illegible]

various kinds of Eucalyptus, and it was then [illegible] E resinifera, *Smith*, and E. rostrata, *S* [illegible] for cultivation in the plains. These two [illegible] their character, and there are now several [illegible] Saharanpur and Lucknow, which [illegible] ties in Northern India best suited for [illegible]

HISTORY.

Rânikhet and Abbottabad. **E. citriodora,** *Hook.*, and **E. melliodora,** *A. Cunn*, both having deliciously-scented foliage, are thriving well in many places in the plains of North India.

The following communication was received from the Conservator of Forests, Panjáb, in August 1889:—"A considerable number of different species of Eucalyptus have been tried in various parts of the Province, but on the whole the results have not been satisfactory; it has been found, however, that planting in groves gives a better chance of success than when the trees are grown singly along roads, &c. In Kangra, in the Kothala estate, and in Kulu, a few specimens of the "blue gum" and other unknown kinds, have done well, and experiments are now being made in the Dera Tahsil.

"The species has been introduced into Bashahr, but has not yet established itself; but in Hazara, the experiments have been successful, and there are now a number of trees round Abbottabad 80 feet high. In Chamba attempts were made at Kalatop, Chamba, and Bakloh; at the two former places they failed, but there are about 100 trees flourishing at Bakloh. The most extensive experiments that have been made were in the Lahore District at Changa Manga and in the carob plantation at Lahore. In all twenty-five species have been tried; but out of these only three, **E. rostrata, E. citrioides,** and **E. resinifera,** have had any real success.

"The cause of this failure may be mainly attributed to three sources: *1st*, failure in the rains; *2nd*, injury to the young stems by sunburn; *3rd*, the worst of all, the white ants which attacked the tree by eating away the supporting roots. From these causes, but mainly from the last, only some 300 Eucalypti have succeeded in Changa Manga out of the several lakhs that have been planted out.

382

Eucalyptus Globulus, *Labill.*; MYRTACEÆ.

BLUE GUM-TREE OF VICTORIA AND TASMANIA.

Vern.—*Kurpúra maram*, MADRAS.

References.—*Brandis, For. Fl., 231; Gamble, Man. Timb., 188; Flück. & Hanb., Pharmacog., 280; U. S. Dispens., 15th Ed., 565; Bent. & Trim., Med. Pl., 109; Year-Book, Pharm., 1874, 25, 113, 221; 1875, 5; Christy, Comm. Pl., V., 45; Drury, U. Pl., 199; Kew Reports, 1877, 29; 1879, 16; 1881, 12; 1882, 20; Kew Off. Guide to the Mus. of Ec. Bot., 65; Kew Off. Guide to Bot. Gardens and Arboretum, 116, 117; Journ. Agri.-Hort. Soc., 1885, Vol. VII., pt. iii.; Procgs., xcviii.; Ind. For., 1885, Vol. XI., No. 2, 51; Journ. Agri.-Hort. Soc., 1875-78, Vol. V., 1; Madras Man. of the Administration, II., 110; Mueller, Select Extra-Trop. Pl., 150.; Report, Horticultural Gardens, Lucknow, 1888-89, 7.*

Habitat.—A lofty tree, gregarious in Victoria and the south of Tasmania. Its introduction into India has met with complete success on the Nilghiris, where the plantations, which were started in 1863, are well established. It has also been successfully cultivated at Abbottabad and Ranikhet. It does not thrive in the plains, nor on the outer Himálayan ranges.

CULTIVATION. 383

Cultivation.—The seeds of the 'Blue gum' are unsually large for the genus; they germinate freely, and the seedlings at once begin to shoot up with marvellous rapidity. Great care, however, is required in transplanting them.

GUM. Bark. 384

Gum.—The BARK of this tree exudes an astringent gum resembling, both in appearance and properties, that which, under the name of *kino*, is yielded by **Pterocarpus Marsupium.** It is known in trade as 'Australian,' 'Botany Bay,' or, 'Eucalyptus kino.' A kino of better quality is obtainable from other species of **Eucalyptus,** such as **E. rostrata, E. corymbosa,** and **E. citriodora,** and, according to the authors of the *Pharmacographia*, might with no disadvantage be substituted for that of true kino.

TAN AND DYE. 385

Tan and Dye.—The gum above mentioned is used for "tanning and dyeing."

FIBRE. Bark. 386

Fibre.—The BARK of this tree yields a material which has been found suitable for making paper.

OIL. Leaves. 387 Shoots. 388

... used in the ... lso said to ... roperties of ... InitedStates ... forded 2·75 parts per hundred, the recently-dried parts 6 parts." "M. Cloez believes the oil to be composed of two camphors, differing in their volatility. The bulk of the oil yielded is the portion first distilled; to this Cloez has given the name of *Eucalyptol*. To obtain it pure a redistillation from caustic potash or chloride of calcium is necessary. It is very liquid, nearly colourle ... *the right, is sl* ... *the formula* ... acid; by the action of phosphoric acid it is converted into *eucalyptene*, a substance allied to *cymene*, and *eucalyptolen*." (*15th Ed.*, *566.*)

MEDICINE. Oil. 389

Medicine.—The leaves yield an essential OIL used in medicine, and sometimes as a substitute for Cajeput oil. ... as a remed... intermittent ...

SPECIAL OPINIONS.—"I have used ʒss doses of the leaves infused in an inhaler in cases of chronic thickening of the mucus membrane of fauces and throat with marked good results: one case of over 3 years' standing quite recovered under its use." (*Honorary Surgeon Easton Alfred* ...)

"An infusion of the leaves, or ten to twenty drops of the oil in a pint of boiling water, excellent for steaming the throat when ulcerated." (*Surgeon-Major W. Farquhar, M.D., I.M.D., Ootacamund.*)

FOOD. 390

Food.—A liquor is made from Eucalyptus that has attained some reputation in Australia.

TIMBER. 391

Structure of the Wood.—Strong, tough, and durable, and extensively used in Australia for ship-building, house-building, sleepers, telegraph poles, &c. It has been found by experiments to rival in strength the best English oak.

INDUSTRY. 392

INDUSTRIAL USE.

In a recently published report on the Lucknow Horticultural Gardens, it is mentioned that a new demand for the leaves of the tree has arisen, owing to the discovery having been made that a decoction has the power of removing the scale or incrustation which forms in locomotive boilers, as a deposit from the water.

The matter is now engaging the attention of the Locomotive Department of the Bengal and North-Western Railway at Gorakhpur, and it is reported that the trials there made have had good results.

The following extract from a letter regarding the method of use is published: "We have a large tank, which we fill with leaves and small branches, the water is then put in, and boiled or made warm with waste steam. This continues till the fluid has a dark colour, when it is used; say, two or three gallons of the decoction is put into the tender, and so mixes with the water or enters the boiler with the feed.

"I learn excellent results are being obtained, as the scale tumbles off the plates when the boilers are being washed out."

EUCHLÆNA, *Schrad.; Gen. Pl., III., 1114.*

393

Euchlæna luxurians, *Ascheron; Duthie, Fodder Grasses, N. Ind.*, [19; GRAMINEÆ.

TEOSINTE, *Fr.*

Syn.—REANA LUXURIANS.

References.—*Christy, Comm. Pl., III., 5; Smith, Dic., 409; Kew Reports, 1879, 17; 1880, 80; Journ. Agri.-Hort. Soc., 1885, Vol. VII., pt. 3, New Series; Procgs., Soc., CVII.; Ind. For., X., III., 111; Journ. Agri.-Hort. Soc., VI., 117; Müeller, Select Extra-Trop. Pl., 165.*

Habitat.—A native of Guatemala. It is a quick-growing succulent grass resembling maize. It requires 9 or 10 months from sowing to the ripening of its seed, and within that period single cultivated specimens have been known, under generous treatment, to produce as many as 90 stems, and to attain 18 feet in height. It is a prolific seed-bearer. Dr. Schweinfurth is reported to have secured from three seeds about 12,000 grains.

FODDER. 394

Fodder.—The grass is described as a most excellent fodder for cattle. The attempts hitherto made to introduce it into India have not had any definite results, for while in some places it has been favourably reported on, in others it has failed, and the general opinion is that it could never compete with the existing fodder plants of India, such as *juar*, &c., as its cultivation on a large scale would be too expensive owing to its requiring rich soil and constant irrigation.

395

EUGENIA, *Linn.; Gen. Pl., I., 718.*

A large genus, containing over 700 species, of which about one fifth are represented in British India. They consist of trees or shrubs with evergreen, smooth foliage; and many of them are very handsome when in flower. They are found most abundantly in the humid regions of North, East, and South India, also in Burma, Malaya, and Ceylon. A few only of the Indian species are of economic importance. The three sections, Jambosa, Syzygium, and Eugenia, have by many writers been treated as separate genera. In Syzygium the petals are combined, and usually fall off in one piece; many of the species are fine large timber trees. In Jambosa and Eugenia the petals are free and spread-

ing Linnæus is said to have named the genus after Prince Eugene of Savoy

Eugenia alba, *Roxb*, MYRTACEÆ, see E javanica.

E. aquea, *Burm, Fl Br. Ind, II, 473, Wight, Ic, t 216, 550*

Syn —JAMBOSA AQUEA, DC

Vern —*Jambo*, BENG, *Wat jambu*, SING

References —

Habitat.—A medium-sized tree, with large white flowers It is a native of the Moluccas and is wild also in Ceylon It has been planted extensively in Bengal and Burma

Food.—The fruit, which is of about the size of a loquat and flattened at the end, is either pale rose-coloured or white, the former has an aromatic taste, the latter is the *jambo ayer* of Rumphius

E. Arnottiana, *Wight, Fl Br Ind., II, 463, Wight, Ic, t 999*

Vern —*Vawal*, S INDIA

References —*Beddome For Man, 107 Ind For, X, 552*

Habitat —A large spreading tree, common in the moist woods on the Nilghiri, Pulney, and Anamallay hills of South India

Food —Fruit dark purple, Beddome says that it is eaten, but is very astringent

Structure of the Wood —The timber is said to be valuable

E. calophyllifolia, *Wight, Fl Br Ind, II, 494, Wight Ic, t 1000*

References —*Beddome, For Man, 107 Thwaites, Enum Ceylon Pl, 118, Ind For, X, 552*

...

a d other purposes (*Beddome*)

E. caryophyllæa, *Wight, Fl Br Ind, II, 490; Wight, Ic, t 540*

Syn —SYZYGIUM CARYOPHYLLÆUM, *Gærtn*

...

in Ceylon

Gum —The tree is said to yield a gum somewhat resembling *kino*

Food.—The round black pea sized berries are eaten in the Bombay Presidency, and also by the Singhalese

E. caryophyllata, *Thunb*, see Caryophyllus aromaticus, Vol II, 202

E. caryophyllifolia, *Lam*, a variety of E Jambolana.

E. cerasiflora, *Kurz*, see E Kurzii

E. cerasoides, *Roxb*, see E operculata.

... ght, Ic., t 606.

... Voigt, Hort Sub Cal.,

Habitat.—A large tree found on mountains in Sikkim and Khasia, altitude 2,000 to 4,000 feet; also in Sylhet, Chittagong, Pegu, Nicobar and Andaman Islands, Tenasserim, Singapore and Penang.

FOOD. 408 Food.—The fruit, which ripens in May, is eaten by the natives.

Eugenia cymosa, *Roxb.;* see E. grandis.

409 **E. formosa,** *Wall.; Fl. Br. Ind., II., 471; Wight, Ic., t. 611.*

Syn.—E. TERNIFOLIA, *Roxb.*

Vern.—*Bolsobak, panchidung,* GARO; *Phul-jamb, lálphul-jamb* (*Roxb.*), CHITTAGONG; *Bara-jáman,* NEPAL; *Famsikol,* LEPCHA; *Bunkonkri,* MICHI.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 399; Voigt., Hort. Sub. Cal., 48; Kurz, For. Fl. Burm., I., 492; Gamble, Man. Timb., 193; Balfour, Cyclop., 1059.*

Habitat.—A handsome moderate-sized tree with very large leaves, met with near streams on the Eastern Himalaya and in Burma. There are two forms, one with white and the other with red flowers.

FOOD. Fruit. 410 Food.—The FRUIT, of about the size of a walnut, is eaten by the natives.

TIMBER. 411 Structure of the Wood.—"Heavy, uniformly brown, close-grained, takes a fine polish." (*Kurz.*)

412 **E. grandis,** *Wight; Fl. Br. Ind., II., 475; Wight, Ic., t. 614.*

Syn.—E. CYMOSA, *Roxb.*

Vern.—*Zebri,* MAGH; *Jam,* BENG.; *Battijamb,* SYLHET; *Taung-thabye, thabyegyi,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 400; Voigt., Hort. Sub. Cal., 49; Kurz, For. Fl. Burm., I., 489; For. Man., 1071; Gamble, Man. Timb., 193; Thwaites, En. Ceylon Pl., 116 & 417; Trimen, Hort. Zeyl., 33.*

Habitat.—An evergreen tree of Eastern Bengal, Burma, and the Andaman Islands.

TIMBER. 413 Structure of the Wood.—"Red, rough, and hard" (*Gamble*). "The wood is used for various economical purposes." (*Roxburgh.*)

414 **E. hemispherica,** *Wight; Fl. Br. Ind., II., 477; Wight, Ic., t. 525.*

References.—*For. Man., 203; Thwaites, En. Ceylon Pl., 116; Trimen, Hort. Zeyl., 33; Balfour, Cyclop., 1059.*

Habitat.—A large handsome tree, common in mountain forests in Southern India and in Ceylon.

TIMBER. 415 Structure of the Wood.—The timber is said to be useful for various purposes.

416 **E. Heyneana,** *Wall; Fl. Br. Ind., II., 500; Wight, Ic., 539.*

Syn.—E. SALICIFOLIA, *Wight;* SYZYGIUM SALICIFOLIUM, *Grah.*

Vern.—*Gara-kuda,* KÓL.; *Gara-kud,* SANTAL; *Jamti,* KHARWAR; *Hend,* GOND; *Gambu,* KURKU; *Jánbu, jámun,* C. P.; *Panjam-bul,* MAR.

References.—*Brandis, For. Fl., 234; Grah. Cat. Bomb. Pl., 73; Elliot, Fl. Andhr., 40; Gamble, Man. Timb., 195; Dalz. & Gibs., Bomb. Fl., 94; For. Man., 109; Lisboa, U. Pl. Bomb., 339; Balfour, Cyclop., II., 411; For. Adm. Report, Ch. Nagpur, 1885, 31.*

Habitat.—A shrub or small tree found in the Bombay Gháts, and in the beds of rivers in Berar and the Central Provinces.

FOOD 417 Food.—The FRUIT is eaten by the natives in the Central Provinces.

TIMBER. 418 Structure of the Wood.—Similar to that of E. Jambolana, but pores smaller. (*Gamble.*)

419 **E. Jambolana,** *Lam.; Fl. Br. Ind., II., 499; Wight, Ic., t. 535.*

BLACK PLUM, *Eng.*

Syn.—SYZYGIUM JAMBOLANUM, *DC.*

The Black Plum. (*J. F. Duthie*) EUGENIA Jambolana.

Vern.—*Jáman, jam, jamun, phalinda, phalanda, jamni phalani, pharenda, phaunda, paiman,* HIND; *Jám, kala-jám,* BENG; *Zebri, chaku kau,* MAGH; *Kuda,* KÓL; *Kudu, kud,* (*so-kod, chuduk'-bad,* Rev A Campbell), SANTAL; *Jamo, jámkuli,* URIYA; *Jamu,* ASSAM; *Chambu,* GARO; *Phoberkúng,* LEPCHA; *Kor jam,* MICHI; *Jam,* MAL (S P); *Naindi,* GOND; *Jambun,* ORAON; *Jamun,* RAJ; *Jamun, jamin, jamul,* C. P; *Jambul, jámbu, jámbhul, jambudo,* BOMB; *Jambúl,* MAR; *Jambu, jambura, jámbudi,* GUZ.; *Naval, narvel, nawal, nawar, naga,* TAM; *Nerale,* MYSORE; *Naredu, racha-neredu, pedda neredu* (large fruited var.), *nairuri, nareyr, nasodu, nasedu,* TEL.; *Narala, nerlu, nerale,* KAN; *Thabyebyu,* BURM.; *Mahadan, madan-naval, mudang,* SING; *Jambu, jambula,* SANS

Re[illegible]

[illegible]

GUM. 420

[illegible] Assam [illegible] to the colour; it is also used to colour fishing-nets. It is mentioned as one of [illegible]

DYE and TAN. Bark. 421

[illegible]

MEDICINE. Bark. 422

Juice. 423

Seeds. 424

[illegible] ful in the treatment of diabetes.

SPECIAL OPINIONS.—"The powder of the dried stone of the fruit is used in cases of diabetes It certainly does diminish the quantity of sugar in [illegible] (*Sikharam Arjun Ravat, L.M., Bombay.*) "Decoction of the bark used as an astringent gargle in sore-throat, and juice of the fresh tender leaves is given with goat's milk in cases of dysentery" (*Bolly Chund Sen, Teacher of Medicine, Campbell Medical School, Sealdah, Calcutta.*) "A decoction of the bark is used largely for diarrhœa and dysentery in combination with carminatives such as cardamoms and cinnamon." (*Dr. Bensley, Civil*

The Black Plum.

MEDICINE.

Surgeon, Rajshahye.) "160 grains of the pulverized seed is taken as an antidote in cases of Nux vomica poisoning." (*Surgeon W. F. Thomas, Madras Army, Mangalore.*) "Used in diabetes and in enlargement of spleen. Dose of extracted juice, about 4 drachms." (*Civil Surgeon John McConaghey, M.D., Shahjahanpore.*) "The syrup of the fruits is used in diarrhœa." (*Civil Surgeon, R. Gray, Lahore.*) "The decoction of the bark is used as a gargle in salivation, whether brought on by prolonged use of mercury or other causes." (*Civil Surgeon Bankabehari Gupta, Poor e.*) "The ripe fruit is considered curative for calculous affections. The leaves are used as a poultice for scorpion bite." (*Surgeon-Major Robb, Civil Surgeon, Ahmedabad.*) "The vinegar manufactured from the ripe fruit is much used as a stomachic by the natives and is useful in cases of enlargement of the spleen. The doses used are one to two drachms. The fruit is useful in diarrhœa." (*Narain Misser, Kothe Bazar Dispensary, Hazaribagh.*) "The vinegar of ripe fruit is cooling and used in indigestion. The juice of fresh leaves is used in spongy and painful gums." (*Shib Chundra Bhattacharji, Chanda, Central Provinces.*) "Grows very commonly and is extensively used as an astringent in Mysore." (*Surgeon-Major John North, Bangalore.*)

FOOD. 425

Food.—The fruit, which is sometimes as large as a pigeon's egg and of a purple colour, is eaten by all classes of people: it is sub-acid and rather astringent, and is improved in taste by being pricked and rubbed with a little salt, and allowed to stand an hour. In Goa, a wine, faintly resembling port, is prepared from the ripe fruit.

"A sort of spirituous liquor called *Jámbava* is described in recent Sanskrit works as prepared by distillation from the juice of the ripe fruits." (*U. C. Dutt, Mat. Med. Hind., 164.*) The Collector of Madura reports that the fruit should not be extensively eaten as it is apt to bring on fever. Paludanus in a note appended to *Van Linschoten's Voyage*, says:—"This fruit is little used by Physitions, but is much kept in pickle, eaten with Sodden Ryce, for they procure an appetite to meat."

TIMBER. 426

Structure of the Wood.—Reddish-grey, rough, moderately hard, darker near the centre; no distinct heartwood. It is fairly durable. Five sleepers of it were laid down in 1870 on the Oudh and Rohilkhand Railway, and taken up in 1875, when they were reported to be fairly sound and not touched by white-ants. It is used for building, agricultural implements and carts, also for well-work, as it resists the action of water.

DOMESTIC and SACRED. 427

Domestic and Sacred Uses.—It is often planted as a shelter tree for groves, and, as such, is known under the name of *jamoa* in the Saharanpur and Karnál districts. In habit it is very different from the type, and should perhaps be considered as a distinct variety.

"The god *Megh* is said to have been transformed into a jambul tree. The colour of the fruit being dark like that of Krishna, this plant is very dear to him; it is, therefore, worshipped, and Brahmins are fed under it. The leaves are used as platters or *panch pallows* and for pouring libations." (*Lisboa, U. Pl. Bomb., 284.*)

428

Var. caryophyllifolia, *Fl. Br. Ind., II., 499; Wight; Ic., t. 553.*

Syn.—E. CARYOPHYLLIFOLIA, *Lam.*; SYZYGIUM CARYOPHYLLIFOLIUM, *DC.*; S. LATERIFLORUM, *Royle.*

Vern.—*Chota-jamb*, BENG.; *Jamun*, KOL.; *Bir-kod*, SANTAL; *Bata-jania*, TEL.; *Nairla*, KAN.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 398; Voigt., Hort. Sub. Cal., 49; Brandis, For. Fl., 234; Thwaites, En. Ceylon Pl., 417; Drury, U. Pl., 410; Lisboa, U. Pl. Bomb., 77; Cooke, Gums and Gum-resins, 11; Gums and Resinous Prod. of Ind. (P. W. D., 1871), 68; Balfour, Cyclop., I., 1059.*

Habitat.—Found in most parts of India. Its lanceolate acuminate leaves, and small pea-shaped fruit, distinguish it from the type.

The Rose Apple. (J F Duthie) | EUGENIA Jambos.

Gum —"Yields a very good gum, grows in the Mysore district." (*Gums and Resinous Prod of India, P W D, 1871*) — GUM 429

Medicine —The Rev A Campbell states that in Chutia Nagpur the LEAVES are used medicinally — MEDICINE Leaves 430

Structure of the Wood —"Whitish, very strong, close grained, hard and durable" (*Roxb*) — TIMBER. 431

Eugenia Jambos, *Linn ; Fl Br. Ind, II, 474 ; Wight, Ic, 435* — 432

ROSE-APPLE

Syn —JAMBOSA VULGARIS, *DC*

Vern —*Gulab-jaman* HIND, *Guláb jamb*, BENG, *Golapjam*, URIYA, *Jamu*, SIND, *Jámb* DECCAN; *Malle nerale pan nerale*, COORG, *Pannerali*, KAN, *Jambu*, SING, *Jamba* (*Roxb*), *jambu*, SANS, *Toffah*, ARAB

References —Roxb Fl I d Ed C B C 401 Voigt Hort Sub Cal

DESCRIPTION. 433

HISTORY. 434

Jambos do grow are as great as Plum trees, and verie like unto them it is an excellent and a (verie) pleasant fruite to looke on, as big as an apple, it hath a red colour and somewhat whitish, so cleare and pure that it seemeth to be painted or made of waxe it is very pleasant to eate, and smelleth like rose water, it is white within, and in eating moyst and waterish, it is a most daintie fruite, as well for bewtie to the sight, so for the sweet savour and taste, it is a fruite that is never forbidden to any [illegible]

island or continent which [illegible]
one hundred and eighty [illegible]
each six hundred miles [illegible]
Jambudeba, Eugenia isl [illegible]

 The Malay Apple.

pur," p. 156, referring to this tree, also says:—"The Indians indeed are said to have given its name to their position of the world, *Jambudwip* or the Island of the Jumbu tree." It may be here added that the Rose-apple is wrongly referred by Yule, Mason, and others to E. Jambolana.

MEDICINE. Leaves. 435

Medicine.—In Bhamo, Upper Burma, the LEAVES are boiled and used as a medicine for sore eyes.

FOOD. Fruit. 436

Food.—The FRUIT, which is usually produced during the rainy season, is about the size of a small apple. By many persons it is highly esteemed on account of its delicate flavour which resembles rose-water, but there is a want of juice which renders it unpalatable. In the neighbourhood of Calcutta the fruiting branches are covered with pieces of cloth, and this is believed to increase the size as well as the flavour of the fruit. A preserve is sometimes made of the fruit.

TIMBER. 437

Structure of the Wood.—"Reddish brown" (*Brandis*).

DOMESTIC. 438

Domestic Use.—In Burma the leaves are said to be much prized for ornamental purposes.

439

Eugenia javanica, *Lamk.; Fl. Br. Ind., II., 474; Wight, Ic., t. 548.*

Syn.—E. ALBA, *Roxb.*

Vern.—*Jamrul, amrul*, HIND.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 400; Voigt., Hort. Sub. Cal., 47; Kurz, For. Fl. Burm., I., 491; Trimen, Hort. Zeyl., 33.*

Habitat.—A tree of Malacca, Andaman and Nicobar Islands. Introduced into Bengal, where it is now common, chiefly in gardens.

FOOD. 440

Food.—Produces abundantly during the hot and rainy seasons a fruit which when ripe is pure white and shining; though juicy and refreshing it is almost tasteless; it is eaten, however, by all classes of people.

TIMBER. 441

Structure of the Wood.—"Red, rough, and hard" (*Gamble*).

442

E. Kurzii, *Duthie; Fl. Br. Ind., II., 478.*

Syn.—E. CRASSIFLORA, *Kurz.*

Vern.—*Jámun*, NEPAL; *Sunom*, LEPCHA.

References.—*Kurz, For. Fl. Burm., I., 491; Gamble, Man. Timb., 193; Journ. As. Soc. Beng., XLVI. (1877), ii., 68.*

Habitat.—A large evergreen tree, met with in the hills of Bengal and Burma, from 3,000 to 6,000 feet.

TIMBER. 443

Structure of the Wood.—"Reddish-grey, moderately hard, rough" (*Gamble*).

444

E. malaccensis, *Linn.; Fl. Br. Ind., II., 471; Wight, Ic., t. 98.*

MALAY APPLE or the KAVIKA TREE.

Syn.—JAMBOSA MALACCENSIS, *DC.*

Vern.—*Maláka jamrul*, BENG.; *Nati-shambu* (Rheede), MALAY; *Thabyo-thabyay*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 397; Voigt., Hort. Sub. Cal., 47; Kurz, For. Fl. Burm., I., 493; Gamble, Man. Timb., 193; DC., Origin Cult. Pl., 241; Trimen, Hort. Zeyl., 33; Rheede, Hort. Mal., I., 29, t. 18; Lisboa, U. Pl. Bomb., 155; Baron F. von Muell., Sel. Extra-Trop. Pl., 167; Smith, Dic., 260; Mason, Burma, 450.*

Habitat.—A handsome tree, with a profusion of either white or scarlet flowers, followed by an abundance of fruit of the size of a small apple. It is a native of the Malay Islands, and is now cultivated in Bengal and Burma, chiefly in gardens. The Malay looks upon the '*Kavika*' tree as representing all that is lovely and beautiful.

445

The note by Paludanus appended to Linschoten's description of the Rose-apple tree evidently refers to E. malaccensis. He mentions the fact of its having been "first brought out of Malacca into India," and he describes the flowers as "of a reddish purple colour," and the fruit "as

The Eugenias (J F Duthie) EUGENIA operculata.

DESCRIPTION.

FOOD. 446

which is very commonly eaten, though rather insipid (Roxb) The pulp of the fruit is said to be wholesome and agreeable Paludanus (l c) ... ate be set upon the

TIMBER 447

Weight, Wallich gives 30 our specimen 38lb per cubic foot (Gamble)

448

ht, Ic, t 1060

the Nilghiris purposes, &c'

TIMBER 449

(Beddome)

450

E. oblata ...

al, 48,

Habitat.—A tree found in Eastern Bengal, Burma, Penang, and Singapur In Chittagong it is cultivated for its fruit

FOOD 451

Food.—The fruit, about the size of a cherry, is according to Roxburgh, edible

TIMBER. 452

Structure of the Wood.—Roxburgh also states that the wood is in some estimation

E obovata, *Kurz*, a variety of E. operculata.

453

E. operculata, *Roxb., Fl Br Ind, II, 498, Wight, Ic, tt 552 & 615*

Syn.—E cerasoides, *Roxb*

Vern.—*Rai jáman, paiman jamawa dugdugia*, Hind; *Topa*, Kol, *Totonopak*, Santal, *Botee-jam* (Roxb), Chittagong, *Teathaby-ay*

Hal

MEDICINE. Fruit. 454 Bark. 455 FOOD. Fruit. 456 TIMBER. 457 458

down to the consistence of ... the

LE ... yed

me ...

the

hot weather

Structure of the Wood.—"Reddish-grey, hard, used for building and

References.—*Kurz, For Fl Burm, I, 482; Gamble, Man Timb., 194 For Adm Report, Ch Nagpur, 18 5, 31*

Habitat.—Found in the savannah forests of Bengal and Burma.

TIMBER. 459

Structure of the Wood.—Grey, rough, moderately hard.

460

Var. Paniala (*Roxb., sp.*); *Fl. Br. Ind., II., 498.*

Vern.—*Paniala-jamb*, BENG.

Reference.—*Roxb., Fl. Ind., Ed. C.B.C., 399.*

Habitat.—Found in Chittagong, Sylhet, and Burma. Roxburgh describes it as one of the largest and most robust trees of the genus.

FOOD. Fruit. 461

Food.—The FRUIT ripens in June, and is "about the size of a small gooseberry and very juicy" (*Roxburgh*).

Eugenia Pimenta, *DC.*; see Pimenta officinalis.

E. salicifolia, *Wight*; see E. Heyneana.

E. ternifolia, *Roxb.*; see E. formosa.

462

E. tetragona, *Wight; Fl. Br. Ind., 497.*

Vern.—*Kemma, chamlani*, NEPAL; *Sunóm*, LEPCHA.

References.—*Voigt, Hort. Sub. Cal., 49; Kurz, For. Fl. Burm., I., 484; Gamble, Man. Timb., 194.*

Habitat.—A large evergreen tree, found in the hills of Northern Bengal up to 6,000 feet, and in Chittagong.

TIMBER. 463

Structure of the Wood.—Brownish or olive-grey, shining, hard; it is used occasionally for building, for the handles of tools, and for charcoal.

464

E. zeylanica, *Wight; Fl. Br. Ind., II., 485; Wight, Ic., 73.*

Vern.—*Sagarabatna*, URIYA; *Bhedas*, MAR.; *Nerkal*, KAN.; *Thabye-pauk*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 402; Kurz, For. Fl. Burm., I., 481; Beddome, Fl. Sylv., ccii; Thwaites, En. Ceylon Pl., 118; Dalz. & Gibs., Bomb. Fl., 94; Rheede, Hort. Mal., V., t. 20; Gaz. Bomb., XV., Pt. I., 68.*

Habitat.—A small myrtle-like shrub of the scrubby forests of Orissa; a shrub or small tree in the Concan and southwards, also in Sylhet, the Malay Peninsula, and the Andamans.

TIMBER. 465

Structure of the Wood.—In Kánara it is used for building purposes and for field tools.

466

EULOPHIA, *R. Br.; Gen. Pl., III., 535.*

The *salep* obtainable in Indian bazars has been ascertained to be the product of two species of **Eulophia**, *viz.*, **E. campestris** and **E. herbacea**, and possibly of others. *Salep* or *sálib misri* consists of the dried tubers of the above-mentioned orchids and of several species of **Orchis**, which latter constitute the bulk of the *salep* of European commerce. Its oriental reputation as an aphrodisiac was founded merely on superstition in connection with the so-called doctrine of signatures. It possesses no medicinal properties whatsoever. A decoction prepared from powdered *salep*, and flavoured with wine and spice, is considered a *more or* less nutritious and agreeable drink for invalids. Mr. J. G. Baker of Kew, in the discussion which followed the reading of Dr. Aitchison's paper before the British Pharmaceutical Society (December 8th, 1886), said that Dr. Aitchison had practically disposed of the much-debated question as to the source of the *Royal salep* or *badjah*. Mr. Baker, acting on a suggestion made by Hanbury, said that this form of *salep* resembled a bulb more than a tuber, and that he had succeeded in tracing out what appears to be the source of that drug. Dr. Aitchison had brought fresh specimens of these bulbs, and they proved to be **Ungernia trisphœra**, a plant belonging to the AMARYLLIDACEÆ. Dr. Dymock writes that the *salep* of Bombay commerce is imported from Persia, Cabul, and Northern India, and is probably obtained from various species of **Orchis**, under which genus further information on this product will be found. (For further information see **Curculigo Orchioides**, Vol. II., 650).

Eulophia campestris, *Lindl.*; Orchideæ. 467

Vern.—*Sung-misrie* (Irvine), Beng.; *Bonga taini*, Santal; *Halti paila*, Nepal; *Salib-misri*, Pb.; *Sálum*, Guz.

References.—*Stewart, Pb. Pl.*, 236; *Dymock, Mat. Med. W. Ind.*, 789; [illegible]

[illegible] the [illegible] the [illegible] rds [illegible] ons [illegible] ass. [illegible] ere [illegible] and

MEDICINE. 468

[illegible]

FOOD. 469

layan and [illegible] species and use them for family consumption as salep; they regard them as an easily digestible kind of farinaceous food.

E. herbacea, *Lindl.* 470

Syn.—E. vera, *Royle* (?)

References.—[illegible]

[illegible] hered nea[illegible] us he believed to be the source of the true *salep misri* of commerce, and distinct from that of E. herbacea According to other writers this species occurs on the mountains of South India.

EUONYMUS, *Linn.*; *Gen. Pl.*, *I. 360.*

Euonymus crenulatus, *Wall.*; *Fl. Br. Ind.*, *I.*, *608*; *Wight. Ic.*, [*I. 973*; Celastrineæ. 471

References.—*Beddome, Fl. Sylv. t.*, 144; *Gamble, Man. Timb.*, 84; *Drury, U. Pl.*, 203; *Balfour, Cyclop.*, *I.*, 1060.

Habitat.—A small tree, common in hilly parts of South India.

Structure of the Wood.—White, very hard and close-grained; answers for wood engraving, and is about the best substitute for boxwood in the Madras Presidency (*Beddome*).

TIMBER. 472

E. glaber, *Roxb.*; *Fl. Br. Ind.*, *I.*, *609* 473

References.—*Roxb., Fl. Ind., Ed. C.B.C.*, 211; *Voigt, Hort. Sub. Cal.*, 175; *Kurz, For. Fl. Burm.*, *I.*, 250

TIMBER. 474

Habitat.—A small tree found in East Bengal and in Burma.

Structure of the Wood.—Brownish yellow, turning brown; heavy, rather close-grained and hard, but soon attacked by xylophages. Fine wood for furniture (*Kurz*).

475

Euonymus grandiflorus, *Wall.; Fl. Br. Ind., I., 608.*

Syn.—E. LACERUS, *Ham.*

Vern.—*Siki, pattali, papar, banchír, dudhapár, hanchu, pásh, mara, chikan, rangchúl, kioch,* PB.; *Gule, grui,* SIMLA.

References.—*Voigt., Hort. Sub. Cal., 166; Brandis, For. Fl., 78; Gamble, Man. Timb., 84; Wall., Pl. As. Rar., III., 35, t. 254; Atkinson, Him. Dist., 307.*

Habitat.—A small deciduous tree of the Himálaya, from the Indus to Sikkim, between 6,000 and 11,000 feet.

FODDER. 476

Fodder.—The young shoots and leaves are lopped to feed goats.

TIMBER. 477

Structure of the Wood.—White, moderately hard, exceedingly compact, close and even-grained. It is used for carving (*Gamble*).

DOMESTIC. 478

Domestic Use.—According to Brandis, the seeds with their bright red arils are strung up and used as ornaments in Bussahir.

479

E. Hamiltonianus, *Wall.; Fl. Br. Ind., I., 612.*

Syn.—E. ATROPURPUREUS, *Roxb.*

Vern.—*Agniun, agnu,* KUMAON; *Brahmáni,* KASHMIR; *Siki, singi, chual, watal, papar, rithu, randi, banchor, karún, skioch, sidhera, naga,* PB.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 211; Voigt., Hort. Sub Cal., 165; Brandis, For. Fl., 78; Gamble, Man. Timb., 84; Stewart, Pb. Pl., 41; U. S. Dispens., 15th Ed., 567.*

Habitat.—A large deciduous shrub, or small or occasionally moderate-sized tree of the outer Himalaya, from the Indus to Bhután, and of the Khásia Hills from 4,000 to 8,000 feet (*Gamble*).

FODDER. 480

Fodder.—The young leaves and shoots are lopped for fodder (*Brandis*).

TIMBER. 481

Structure of the Wood.—White, with a slightly yellow tinge, soft, close-grained. It is used for carving into spoons (*Gamble*).

E. japonicus, *Wall*; see E. pendulus, *Wall.*

482

E. pendulus, *Wall.; Fl. Br. Ind., I., 612.*

Syn.—E. JAPONICUS, *Wall.* (not of *Thunb.*)

Vern.—*Chopra, pincho, garúr, kúnku,* N.-W. P.

References.—*Brandis, For. Fl., 79; Gamble, Man. Timb., 84; Atkinson, Him. Dist., 307.*

Habitat.—A moderate-sized evergreen tree, found in the Himaláya, from the Jhelum to Nepal, between 2,500 and 7,500 feet (*Gamble*).

CHEMISTRY. 483

Chemistry.—Dr. Dymock writes the following as the result of his analysis of a specimen of the bark furnished by Dr. G. Watt from Simla:—

"The young branches give a green tincture with spirit and the older bark a red tincture; in each case, on dissipating most of the alcohol and treating with water, a greenish yellow resinous substance falls, and a bright red liquid remains. The resins are soluble in ether and partly in alkalies, and the red astringent supernatant liquor contains tannin, giving a murky green colour with a ferric chloride, and a quantity of saccharine matter. No bitterness was perceived in the extract, and nothing alkaloidal was detected. The aqueous extract of the bark, after exhaustion with spirit, contained a large quantity of a white, neutral, crystalline body, which was dissolved by hot alcohol and crystallized out on cooling. The bark had no marked odour or taste, and afforded a light buff-coloured powder. The powder, treated directly with rectified spirit, gave 45·5 per

light red tinge, very close and even-grained.

TIMBER. 484

Enonymus tingens, *Wall.; Fl. Br. Ind., I, 610.* 485

Vern.—*Newar, kasúri,* NEPAL; *Kungku,* N.-W. P.; *Chopra, mer mahaul,* SIMLA.

References.—*Brandis, For. Fl., 79; Gamble, Man. Timb., 85; O'Shaugh*

the Sutlej

DYE. Bark. 486

n diseases of the eye.

MEDICINE. Plant. 487

Structure of the Wood.—Similar to E. grandiflorus, except that the wood of this species has a slightly reddish tinge.

TIMBER. 488

Domestic Use.—The dye is said to be used in Nepal for marking the *tika* on the foreheads of Hindus.

DOMESTIC. 489

EUPATORIUM, *Linn.; Gen. Pl., II, 245.*

Eupatorium Ayapana, *Vent.; Fl. Br. Ind., III., 244,* COMPOSITÆ. 490

References.—*Pharm. Ind., 127; O'Shaughnessy, Beng. Dispens., 422,*

MEDICINE. 491

virtues have now exploded. It is a good simple stimulant, tonic, and diaphoretic ... and it is ... of snake-b... unfrequent ... having afterwards met with unmerited neglect; and such may, perhaps, be the case in respect to the plant in question." Dymock says that it is not uncommon in gardens in Bombay, and, though not generally known, is held in considerable esteem by those who are acquainted with it.

E. cannabinum, *Linn.; Fl. Br. Ind., III., 243.* 492

THE HEMP AGRIMONY.

References.—*Voigt, Hort. Sub. Cal., 407; Fleming, Med. Pl. and Drugs,*

MEDICINE. 493

(*Fleming, in Asiat. Res., l. c.*)

494

EUPHORBIA, *Linn.; Gen. Pl., III., 258.*

A large genus, containing more than 600 species, which are widely distributed over the greater part of the world. They are popularly known as Spurgeworts, a name which is sometimes applied to the whole family. Linnæus is said to have named the genus after Euphorbus, a physician to Juba, King of Mauritania. The species consist of herbs or shrubs, but in some instances they assume the form of small cactus-like trees, with thick, soft-wooded jointed branches. Though differing so widely in general appearance, they can generically easily be recognized by the structure of their flowers. The monœcious flowers are arranged in clusters, and each cluster, consisting of several jointed stamens (male flowers) surrounding a single female flower, is enclosed within a common involucre. All the species abound in a more or less acrid milky juice, which contains active medicinal properties. The most important extract, known under the name of Euphorbium, is obtained chiefly from E. resinifera, one of the fleshy-stemmed species, indigenous to Morocco. This resinous substance used to be given as a purgative and emetic, but owing to its extremely powerful action, it is now never used as an internal remedy. Its anticorrosive properties have recently created a demand for it as an ingredient of paint for ships' bottoms. Euphorbium occurs in small roundish masses resembling tragacanth; it is of a light yellow or reddish colour, it has no smell, and its taste, at first slight, becomes painfully acrid and burning.

CHEMISTRY. 495

Its chemical composition, according to Flückiger (1868), is as follows:—

Amorphous resin, $C^{10} H^{16} O^{2}$	38
Euphorbon, $C^{13} H^{32} O$	22
Mucilage	18
Malates, chiefly of calcium and sodium	12
Mineral compounds	10
	100

"The amorphous resin is readily soluble in cold spirit of wine containing about 70 per cent. of alcohol. The solution has no acid reaction, but an extremely burning acrid taste: in fact it is to the amorphous indifferent resin, that Euphorbium owes its intense acridity." (*Flück. and Hanb., Pharmacog., 560.*) See also *Spons' Encyclop., II., 1649; U. S. Dispens., 15th Ed., 1641; Ainslie, Mat. Med., I., 120.*

496

Euphorbia antiquorum, *Linn.; Fl. Br. Ind., V., 255; Wight, Ic., [t. 897;* EUPHORBIACEÆ.

Vern.—*Tindhára sehund, tidhára-sehnr, tidhára-sehnd,* HIND.; *Nara sij, tekáta sij, bajvaran, lariya-dáona,* BENG.; *Etkec',* SANTAL; *Dokáná-siju,* URIYA; *Shidu,* MICHI; *Tidhári-send, tin-dhári-send,* DECCAN; *Naraseja,* MAR.; *Tandhári-send,* GUZ.; *Shadhurak-kalli, shadray kullie* (Ainslie), *tirikalli,* TAM.; *Bomma jemudu, bonta-chemudu,* TEL.; *Buma-chumadoo* (Roxb.), *mudu, mula-jemudu,* KAN.; *Katak-kalli, chatirak-kalli, sudusudu,* MALAY; *Shasoung-pya-thal, shazanv-ji,* BURM.; *Daluk,* SING.; *Situnda, vajri, seehoondee* (Roxb.), *vajra-kantaka,* SANS.; *Zaqqume-hindi,* ARAB.; *Zaqunniyœ-hindi, zaqqume-hindi,* PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 392; Voigt., Hort. Sub. Cal., 162; Brandis, For. Fl., 438; Kurz, For. Fl. Burm., II., 416; Beddome, For. Man. 216; Gamble, Man. Timb., 368; Dalz. & Gibs., Bomb. Fl., 226; Elliot, Fl. Andhrica, 29; Trimen, Hort. Zeyl., 70; Rheede, Hort. Mal. ii., t. 42; Pharm. Ind., 204; Ainslie, Mat. Ind., I., 121; O'Shaughnessy, Beng. Dispens., 564; Moodeen Sheriff, Supp. Pharm. Ind., 136; U. C. Dutt, Mat. Med. Hind., 322; S. Arjun, Bomb. Drugs, 198; Drury, U. Pl., 203; Lisboa, U. Pl. Bomb., 114; Atkinson, Gums and Gum-resins, 29; Gums and Resinous Prod. of India (P. W. D., 1871), 28; Balfour, Cyclop., I., 1061; Treasury of Bot., 477; Kew Off. Guide to the Mus. of Ec. Bot., 115; Home Dept. Cor. regarding Pharm. Ind., 240.*

Habitat.—A shrub or small tree, with three- or five- angled branches, common on the dry hills of Bengal and the Peninsula generally. Mr. J. O. Hardinge states that it is common all over Burma, being often cultivated for hedges.

GUM. 497

Gum.—This species was supposed for a long time to be capable of yielding the commercial Euphorbium resin Buchanan Hamilton (*Linn. Trans.*, Vol. XIV) and Royle [illegible]

MEDICINE. Juice. 498

[illegible]

Roots. 499

Bark. 500

Stem. 501

SPECIAL OPINIONS.—§ "The fresh juice of cut branches is irritant, it is applied to painful joints." (*Shib Chunder Bhuttacharji, Chanda, Central Provinces.*) "The juice mixed with burnt borax and common salt is used as an application in painful joints and swellings. The fresh milky juice is a direct irritant both when taken internally and applied externally. Taken in very small quantities it is a drastic purgative. It is also used [illegible]" (*Civil Surgeon J. H. Thornton,* [illegible]

FODDER. 502

[illegible] that in Chutia Nagpur goats [illegible]

TIMBER. 503

Structure of the Wood.—"White, light, soft, but even-grained" (*Brandis*).

DOMESTIC. 504

[illegible]

Euphorbia dracunculoides, *Lam.*; *Fl. Br. Ind.*, *V.*, *262.*

505

Syn.—E. LANCEOLATA, *Heyne*; E. UNIFLORA, *Wall.*

Vern.—*Jy-chee, chhagul-puputi*, BENG.; *Parwa*, SANTAL; *Ricini, sudd[illegible]* (the fruit), *kangi* (the plant), PB.; *Tilla kada*, TEL.

References.—*Roxb.*, *Fl. Ind.*, *Ed. C.B.C.*, *394*; *Voigt, Hort. Sub. Cal.*, *164*; *Stewart, Pb. Pl.*, *193*; *Aitchison, Cat. Pb. and Sind Pl.*, *131*; [illegible]

[illegible] n the Panjáb, Bengal,

OIL. 506

[illegible] ish or greenish-yellow [illegible] 1843 it was submitted [illegible] uable than linseed oil. The *Agri-Horticultural Society of India Journ.*, *1843*, *ii*, *p. 52*, draws attention to this oil.

MEDICINE. Fruit. 507

Medicine.—The FRUIT is officinal and is said to be used to remove warts.

E. granulata, *Forsk.*; *Fl. Br. Ind.*, *V.*, *252.*

508

Syn.—E. AXILLATA, *Edgew.*

Vern.—*Kantka arak'*, SANTAL.

References.—*Edgew.*, in *Journ. As. Soc. Beng.*, *XVI*, *1218.*

Habitat.—A hispid, perennial herb, with prostrate stems, inhabiting the plains of Northern and Central India from Rohilkhand to Sind.

FOOD. Leaves. 509

Food.—"The LEAVES are eaten as a pot-herb by the Santals" (*Rev. A. Campbell*).

Euphorbia helioscopia, *Linn.; Fl. Br. Ind., V., 262.*

SUN SPURGE.

Vern.—*Hirruseeah, mahabi,* HIND.; *Ganda búte, dúdal, kulfa-dodak, chatriwal,* PB.

References.—*Stewart, Pb. Pl., 193; Aitchison, Cat. Pb. and Sind Pl., 132; Murray, Pl. and Drugs, Sind, 32.*

Habitat.—A common field-weed in spring throughout the Panjáb plains and the Siwalik tract, ascending to 7,000 feet in the outer Himálaya. Introduced into the Nilghiri hills.

MEDICINE. Juice and Seeds. 510 Roots. 511

Medicine.—The milky JUICE is applied to eruptions and the SEEDS are given with roasted pepper in cholera. The juice is also used in the form of a liniment in neuralgia and rheumatism, and the ROOT is employed as an anthelmintic (*Murray*).

512

E. hypericifolia, *Linn.; Fl. Br. Ind., V., 249.*

Syn.—E. INDICA, *Lamk.*; E. PARVIFLORA, *Linn.*

Vern.—*Hazárdána* (seeds and leaves), PB.; *Nayeti,* BOMB.; *Dhákti-dudhi,* MAR.; *Ela-dada-kiriya,* SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 394; Voigt, Hort. Sub. Cal., 163; Thwaites, En. Ceylon Pl., 268; Dalz. & Gibs., Bomb. Fl., 227; Stewart, Pb. Pl., 194; Aitchison, Cat. Pb. and Sind Pl., 132; Trimen, Hort. Zeyl., 71; Rheede, Hort. Mal., X., t. 51; Dymock, Mat. Med. W. Ind., 2nd Ed., 694; U. S. Dispens., 15th Ed., 1640; S. Arjun, Bomb. Drugs, 124; Atkinson, Him. Dist., 317; Treasury of Bot., 477.*

Habitat.—A small, slender annual, common throughout the hotter parts of India (from the Panjáb to the Southern Deccan), and occurring up to 4,000 feet on the Himálaya.

MEDICINE.

Medicine.—Stewart mentions that in some parts of the Panjáb it is given with milk to children suffering from colic. S. Arjun remarks that it possesses properties similar to those of E. pilulifera and E. thymifolia. Dr. W. Zollickoffer (in *Am. Journ. of Med. Soc., XI., 22*) recommends an infusion of the dried LEAVES of this herb as a remedy in dysentery, diarrhœa, menorrhagia, and leucorrhœa, and finds that it affects the system as an astringent and feeble narcotic.

Leaves. 513

514

E. Lathyris, *Linn.*

CAPER SPURGE, *Eng.*

Vern.—*Burg-sadab* (Irvine), BENG.; *Sudab,* PB.

References.—*Ainslie, Mat. Ind., I., 599; O'Shaughnessy, Beng. Dispens., 565; U. S. Dispens., 15th Ed., 1713; Irvine, Mat. Med., Patna, 18; Am. Journ. Pharm., XXVI, 305; Spons, Encyclop., II., 1414.*

Habitat.—A perennial herb with narrow glaucous leaves, a native of Central and South Europe.

OIL. Seeds. 515

Oil.—The SEEDS yield by expression, or by the agency of alcohol or ether, a colourless tasteless OIL.

MEDICINE. Oil. 516

Medicine.—The OIL formerly found much favour with certain French and Italian physicians as a purgative owing to its tastelessness (when fresh), and because of the small amount required for a dose. In this country the seeds are said to be used in dropsy, and also to procure abortion. According to Irvine (*Mat. Med. of Patna*), the imported dried leaves, fruits, and stalks are used as a carminative in dyspepsia, and as a deobstruent.

DOMESTIC. 517

Domestic Use.—The capsules are said to intoxicate fish.

518

E. microphylia, *Heyne; Fl. Br. Ind., V., 252.*

Syn.—E. UNIFLORA, *Dalz. & Gibs.*; ? E. CHAMÆSYCE, *Roxb.*

Vern.—*Chota-keruee* (Voigt), BENG., *Dudhia-pusi*, SANTAL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 394; Voigt, Hort. Sub. Cal., 153; Dals. & Gibs., Bomb. Fl., 227; Aitchison, Cat. Pb. and Sind Pl., 131; Rev. A. Campbell, Report Econ. Prod., Chutia Nagpur, No. 7,121.*

Habitat.—A slender, prostrate, much-branched annual, found in [illegible]

MEDICINE. 519

[illegible]

Euphorbia neriifolia, *Linn.; Fl. Br. Ind., V., 255.*

520

Syn.—E. LIGULARIA, *Roxb.*

Vern.—*Sehund, thohar, sij, patton ki-send*, HIND.; *Mansa-sij, pata-sij, hij-daona*, BENG.; *Gangichu*, PB.; *Nivadunga, minaguta, thuhur*, SIND; *Kutte ki jibh ki send, kutte ki jibh ka-patta*, DECCAN; *Minguta, thor, newarang*, BOMB.; *Nevadunga, mingut*, MAR.; *Thor*, GUZ.; *Nevul kanta*, GOA; *Ilaik kalli*, TAM.; *Aku jemudu*, TEL.; *Yelekalli*, KAN.; *Elakalli*, MALAY.; *Shasaung, sha soung, shazdn-mina*, BURM.; *Patuk*, SING.; *Snuhi* (U. C. Dutt), *vajri, sehunda*, SANS.

Re[illegible]

Habitat.—A small, erect, [illegible] spirally twisted, 5-angled branches [illegible] of the subterminal fleshy leaves. [illegible] Central India, and is extensive[illegible] villages in Bengal and elsewhere. [illegible] Kurz, is also found wild, in Burma. [illegible] Islands, &c.

Gum.—It yields a gum, [illegible]

Medicine.—"The milky juice [illegible] As a purgative it is general[illegible] which are steeped in [illegible] &c., are thus treated [illegible] anasarca, and tympan[illegible] compound prescription [illegible] *Hind.*, 233). "The [illegible] snake-bites, both [illegible] acrid milky juice, emp[illegible] The PULP of the stem [illegible] have been bitten in [illegible] (*Taylor, Topog. of Dacca* [illegible]

SPECIAL OPINIONS.—[illegible] with soot is employed [illegible] *T. N. Ghose, Assist.* [illegible] are slightly [illegible] molasses for [illegible] (*Surgeon-Major* [illegible] with clarified [illegible] scabies. It [illegible]

geon J. H Thornton, B.A., M.B., Monghyr) "The milky juice is applied to glandular swellings to prevent suppuration." (*Shib Chundra Bhattacharji, Chanda, Central Provinces.*)

TIMBER. 525

Structure of the Wood.—Attains 20 feet, stem often 12 inches in diameter.

SACRED and DOMESTIC. 526

Sacred and Domestic Uses.—"This shrub is sacred to Mansá, the goddess of serpents. On the fifth day after full moon of the month Sravana (July-August) it is planted in the courtyard of Hindu houses and worshipped as the representative of Mansá." (*U. C. Dutt, Mat. Med. Hind.*, 233.)

527

Euphorbias Nivulia, *Ham.; Fl. Br. Ind., V., 255; Wight, Ic., t.* [*1862.*

Syn.—E. NERIIFOLIA, *Roxb.*

Vern.—*Sij*, BENG.; *Tor, raj*, RAJ.; *Patteoon* (O'Shaughnessy), DECCAN; *Newrang*, MAR.; *Aku jemudu* or *chemudu*, TEL.; *Ela-calli* (Roxb.), MALAY; *Sha-soung*, BURM.; *Pattakarie*, SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 392; Voigt, Hort. Sub. Cal., 162; Brandis, For. Fl., 439; Kurz, For. Fl. Burm., II., 417; For. Man., 216; Gamble, Man. Timb., 368; Dalz. & Gibs., Bomb. Fl., 225; Elliot, Fl. Andhr., 13; Rheede, Hort. Mal., II., t. 43; Pharm. Ind., 204; O'Shaughnessy, Beng. Dispens., 565; Moodeen Sheriff, Supp. Pharm. Ind., 137; Murray, Pl. & Drugs, Sind, 32; Atkinson, Him. Dist., 317; Drury, U. Pl., 206; Balfour, Cyclop., I., 1061; Treasury of Bot., 477.*

Habitat.—A large, fleshy-stemmed shrub, or small tree, with smooth roundish, whorled, branches, found in dry rocky places in Northern and Central India; also in Burma. Often planted for hedges.

MEDICINE. Milk.

Medicine.—The MILK has properties similar to those of **E. neriifolia.**

528

E. parviflora, see **E. hypericifolia.**

529

E. pilosa, *Linn.; Fl. Br. Ind., V., 260.*

Habitat.—A tall, erect, perennial herb, found on the Himálaya from Garhwal westward.

MEDICINE. Root. 530

Medicine.—This is, no doubt, the plant referred to by Stewart under **E. longifolia**, *Don.*, and the ROOT of which Honigberger mentions as being used for the cure of fistulous sores.

531

E. pilulifera, *Linn.; Fl Br. Ind., V., 250.*

Syn.—E. HIRTA, *Linn.*

Vern.—*Dudhi*, HIND.; *Bura keru* (Roxb.), *buro-keruee* (Voigt), BENG.; *Pusi-toa*, SANTAL; *Gordon*, C. P.; *Nayeti*, BOMB.; *Dudhi*, or *mothidudhi*, MAR.; *Dudeli*, GUZ.; *Amumpatchay-arissi*, TAM.; *Bidarie, nanabeeam, nánabála*, TEL.; *Bú-dada-kiriya*, SING.

References.—*Roxb., Fl. Ind., Ed. C. B. C., 394; Voigt, Hort. Sub. Cal., 163; Dalz. & Gibs., Bomb. Fl., 227; Aitchison, Cat. Pb. and Sind. Pl., 132; Elliot, Fl. Andhr., 129; Trimen, Hort. Zeyl., 71; Dymock, Mat. Med. W. Ind., 2nd Ed., 693; S. Arjun, Bomb. Drugs, 123; Atkinson, Him. Dist., 317; Christy, Com. Pl. and Drugs, No. 5, p. 64; No. 7, p. 47; No. 8, p. 55; No. 9, p. 35.*

Habitat.—A small erect or ascending herb, with acute, hispid leaves (having copious crisped hairs), and small fruits. Found throughout the hotter parts of India from the Panjáb eastward, and southward to Ceylon and Singapore.

MEDICINE.

Medicine.—[Indian writers have very little to say as to the properties of this plant. They regard it as equal with **E. thymifolia**, but appear never to have learned that either had a special virtue in the treatment of asthma. The following are the only Indian passages the writer can discover that deal with the properties of these plants: "The PLANT is chiefly used in the affections of childhood, in worms, bowel complaints, and cough. Sometimes prescribed also in gonorrhœa" (*S. Arjun, Bomb. Drugs*).

Plant. 532

The Rev. A. Campbell states that the ROOT is given to allay vomiting, and the plant to nursing-mothers when the supply of milk is deficient

MEDICINE. Root 533

fixed oil. "When subjected to destructive distillation, a distillate was

Food.—The LEAVES and tender SHOOTS have, according to Dr. Shortt, been eaten in the Madras Presidency in times of famine.

FOOD. Leaves. 534 Shoots. 535

Euphorbia pulcherrima, *Willd.*; *Fl. Br. Ind.*, *V.*, 239.

536

POINSETTIA, *Eng.*; FLOR DE PASQUA, *Span.*

Syn.—POINSETTIA PULCHERRIMA, *Graham*.

References.—*Voigt, Hort. Sub. Cal.*, 164; *Brandis, For. Fl.*, 439; *Kurz, For. Fl. Burm.*, *II*, 418; *Gamble, Man. Timb.*, 368.

Habitat.—An ornamental shrub, discovered in Mexico by Graham in 1828. It is cultivated in most Indian gardens; its bright crimson floral leaves appearing about Christmas time.

Gum.—It yields freely a milky sap, which hardens into a black gum, or may be boiled down to a sort of gutta-percha.

GUM. 537

E. Royleana, *Boiss.*; *Fl. Br. Ind.*, *V.*, 257.

538

Syn.—E. PENTAGONA, *Royle, Ill.*, *t.* 82.

Vern.—*Shakar-pitan* (*Balf., Cycl.*), HIND.; *Sohund*, KUMAON; *Shakar pitan, thar, thor, tordanda* (Salt Range), PB.; *Suli* (J.), *chula* (C.), *chun* (R.), *chu, chunga & surs* (B.), *suro & tsui* (S.), PB. HIM.; *Thor*, RAJ.

References.—*Brandis, For. Fl.*, 438; *Gamble, Man. Timb.*, 368; *Stewart, Pb. Pl.*, 194; *Aitchison, Cat. Pb. and Sind Pl.*, 132; *Atkinson, Him. Dist.*, 736; *Balfour, Cyclop.*, *I.*, 1062.

Habitat.—A large fleshy shrub, common on dry rocky hillsides of the outer Himálaya, from Kumáon westwards, ascending to 6,000 feet. It

Ed. Dict. Ec. Prod.]

Medicine.—The acrid, milky JUICE of this plant possesses cathartic and anthelmintic properties.

MEDICINE. 540

Structure of the Wood.—"This is probably the species on the dry hills near Jeypur, which furnishes a great part of the fuel for that city.

TIMBER. 541

Attains 15-16 feet; the stems have generally a girth of 2-3 feet, but sometimes of 5-6 feet. The wood is soft and useless." (*Brandis.*) Near Simla the dry white wood is largely used by the poor classes as fuel.

542

Euphorbia, sp.

The dried roots of an undetermined **Euphorbia** are used in Kuram as a purgative. In large doses it causes vomiting, hence it is called the "vomit-weed." The fresh milk of the leaves causes blisters on the hands when collecting the root (*Aitchison, Kuram Valley Flora, in Journal Linnæan Society, XVIII., page 25*). May this not be **E. Thomsoniana** referred to by the author in Vol. XIX., *l. c.*, page 147?

543

E. Thomsoniana, *Boiss. Fl. Br. Ind., V., 260.*

Vern.—*Hirtiz* (Aitchison), KASHMIR.

Habitat.—A very distinct plant, with glabrous, simple stems, a foot high, rising from a perennial root-stock. It occurs in Western Thibet, Gilgit, &c., at altitudes of 110,000 to 12,000 feet above the sea. (*Fl. Br. Ind.*)

MEDICINE. Root-stocks. 544 Stem. 545 Root. 546 Leaves. 547 DOMESTIC. 548

Medicine.—The crushed ROOT-STOCKS are employed by the natives of Kuram as detergents for washing the hair, and when boiled are given as purgatives (*Aitchison, Kuram Valley Flora; Linnæan Journal, XXIX., page 147*). In Kashmír the root-stock is employed to adulterate "*kut*" (**Saussurea Lappa**), and is called by the Kashmíris "*Hirtiz.*" The STEM, ROOT, and LEAVES are said to be used medicinally. (*Aitchison.*)

Domestic Uses.—The root as a detergent

549

E. thymifolia, *Burm.; Fl. Br. Ind., V., 252.*

Syn.—E. FOLIATA, *Ham.*; E. PROSTRATA, *Grah. (not of Aiton)*; E. RUBICUNDA, *Bl.*

Vern.—*Chotka dudhi*, HIND.; *Swet-kerua* (Roxburgh), *Shwet-keruee* (Voigt), *Dudiya* (Irvine), BENG.; *Nanha-pusi-toa*, SANTAL; *Bara dodak, hazárdána*, PB.; *Nayeti, nayata*, BOMB.; *Mathi-dudhi*, MAR.; *Sittrapaladi, chin-amam, patcha arise* (Balf., Enc.), TAM.; *Reddi vári mánu bála, biduru nána biyyam*,* TEL.; *Bin-dada kuriya*, SING.; *Racta-vinda-chada* (O'Shaughnessy), SANS.; *Hazárdánah*, PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 394; Voigt., Hort Sub. Cal., 163; Dalz. & Gibs., Bomb. Fl., 227; Stewart, Pb. Pl., 195; Aitchison, Cat. Pb. and Sind Pl., 131; Elliot, Fl. Andhr., 27 & 164; Rheede, Hort. Mal., X., t. 33; O'Shaughnessy, Beng. Dispens., 565; Dymock, Mat. Med. W. Ind., 693; S. Arjun, Bomb., Drugs., 123; Murray, Pl., and Drugs, Sind, 33; Irvine, Mat. Med. Patna, 27; Drury, U. Pl., 206; Balfour, Cyclop., I., 1062; Treasury of Bot., 477.*

Habitat.—A prostrate hairy annual, common throughout the greater part of India and Ceylon; ascending in Kashmír up to 5,500 feet; often a conspicuous object as a weed on gravel walks.

MEDICINE. 550 Leaves. 551 Seeds. 552

Medicine.—The JUICE of this plant is known to be a violent purgative. The dried LEAVES and SEEDS are aromatic and astringent, and used in native practice in diarrhœa and dysentery of children along with butter milk (*Murray*). Irvine (*Mat. Med., l.c.*) says that it is common everywhere, and is used as a stimulant and laxative. In the Southern Concan, according to Dymock, the juice is used for the cure of ringworm (hence the name *nayeti*); and mixed with chloride of ammonium, to cure dandriff. O'Shaughnessy says that the juice of the stalks and flowers is a violent purgative; that the fresh plant is, by the Arabs, applied to wounds, and the leaves and seeds given by the Tamúls in cases of worms and in the

* Elliot remarks:—"This is a very doubtful name. It is, however, a Telegu word, and has the signification of 'green or raw rice of *Biduru*.' It may, however, be merely a misprint of *Reddi-vári nánu-pála*. But on the other hand the term 'raw rice,' or *pachchi arise*, is applied to several of the smaller species of **Euphorbia** in the Tamil tongue" (*Fl. Andhrica, p. 27*).

bowel affections of children. Rev A. Campbell mentions that the root is used by the Santals in Amenorrhœa.

FODDER. 553

Fodder.—Eaten by camels and goats in the Multán District.

E. Tirucalli, *Linn.; Fl. Br. Ind, V., 254.*

MILK-HEDGE, MILK-BUSH, OR INDIAN TREE—SPURGE, *Eng.*

Ve[illegible]

Habit [illegible] native of Africa, but has become naturalized in the drier parts of Bengal, the *Deccan, South India, and Ceylon; elsewhere,* it is *largely* cultivated for hedges, and in Berar is much grown to shelter young mango plants from direct sunlight.

GUM. 554

[illegible] certain domesticated animals.

DYE Ashes. 555

[illegible] India as a mordant. Dr. [illegible] not, properly speak- [illegible] he ashes form an in- [illegible] India.)

MEDICINE. Juice. 556

[illegible] s a warm remedy in [illegible] of the spleen, and t[illegible] catory. It is also [illegible] Irvine (*Mat Med.*) [illegible]

SPECIAL OPINIO[illegible] *Major G. Y. Hunter* [illegible] from E. Tirucalli and [illegible] Indian Euphorbias" [illegible] *bay*)

Fodder.—Goats a[illegible] the leaves and the bark.

TIMBER. 568

Structure of the W[illegible] ht of 20 feet; the wood is white close-grained, and st[illegible] &c. Also used for vene[illegible] ing purposes and f[illegible] ives a good charcoal, the manufacture of [illegible] *worth, Conser. F* *Bombay*). only fo[illegible]

EUXOLUS

The Amaranth.

1. **Amarantus spinosus**, *Linn.; Roxb., Fl., Ind., Ed. C.B.C., 663; Grah., Cat Bomb. Pl., 169; Dalz. & Gibs., Bomb. Fl., 216; Wight, Ic, t. 513.* Waste ground throughout India and Ceylon. (*Sir J. D. Hooker, in Fl. Br. Ind, IV., 718*).

2. **A. paniculatus**, *Linn.; Dalz. & Gibs., Bomb. Fl., 215.* **A. frumentaceus**, *Ham; Roxb., Fl. Ind, Ed. C.B.C., 663; Wight, Ic., t. 720.* **A. Anacardana**, *Ham.* (**A. Anardana**). Cultivated throughout India and Ceylon, and up to 9,000 feet on the Himálaya. "Like the following, of which it may be a form, the seeds vary extraordinarily in size, form, and colour" (*Sir J. D. Hooker, l c., 719.*)

3. **A. caudatus**, *Linn.;* **A. cruentus**, *Willd.; Roxb., Fl. Ind, Ed. C.B.C., 663.* Cultivated in various parts of India. "I find it very difficult to distinguish some states of this from **A. paniculatus.** In its typical state it is a smaller plant with the leaves obtuse at the tip, more globose softer masses of smaller red green or white flowers on the thyrse, the terminal spike of which is very long, thick, and drooping." (*Sir J. D. Hooker, l.c., 719.*)

* * *Bracts subulate, equalling or exceeding the three lanceolate sepals and utricle. Stamens three; utricle circumsciss.*

4. **A. gangeticus**, *Linn.; Roxb., Fl. Ind., Ed. C.B.C., 662.* **A. tricolor**, *Linn; Roxb, l.c., 663.* **A. lanceolatus**, *Roxb, l.c., 662.* **A. tristis**, *Linn.; Roxb., l.c., 661; Grah., Cat Bomb. Pl, 169; Wight, Ic., t. 713; Dalz. & Gibs., Bomb. Fl., 215.* **A. oleraceus**, *Roxb, l.c., 662; Wight, Ic., t. 715; Thwaites, En. Ceylon Pl., 247 (not of Linnæus)*, **A. polygamus**, *Roxb, l c., 661; Wight, Ic., t. 714.* **A. lividus**, *Roxb., l c., 662.* **A. melancholicus**, *Linn.; Roxb., l c., 663.* Throughout India and Ceylon. Cultivated or found on cultivated ground. "This is Roxburgh's **A. tristis**, and possibly that of Linnæus, but the latter describes the leaves as ovate-cordate, which these are not. Roxburgh says that his **gangeticus** and **oleraceus** differ from his **polygamus** and **tristis** and their varieties, in not admitting of being cut for successive crops, but being hence unrooted for market" (*Sir J. D Hooker, l.c., 720*).

5. **A. mangostanus**, *Linn.* **A. polygamus**, *Thw. En. Ceylon Pl., 247.* Throughout India and Ceylon, in cultivated ground.

6. **A. Caturus**, *Heyne.* Deccan Peninsula. (*Sir J. D. Hooker, l c., 720.*)

* * * *Bracts usually shorter than the two or three sepals and utricle; stamens two or three; utricle indehiscent or circumsciss.*

7. **A. viridis**, *Linn; Roxb, Fl. Ind., Ed. C.B.C., 661; Grah., Cat. Bomb. Pl., 169.* **A. fasciatus**, *Roxb, l.c., 663; Wight, Ic., t. 717.* **Euxolus caudatus**, *Moq; Wight, Ic, t. 1773.* Waste places throughout India. "**A. fasciatus**, *Roxb.*, is a sport, with a pale crescentic band across the leaf." (*Sir J. D. Hooker, l c, 721*)

8. **A. Blitum**, *Linn.* (*Sir J. D. Hooker, l. c., 721.*)

Var.—**A. oleraceus**, *Linn.;* **E. oleraceus**, *Dalz. & Gibs., Bomb. Fl., 216.* Cultivated in India and elsewhere.

Var.—**A. sylvestris**, *Desf* Kashmír, 4,000 to 6,000 feet (*Thomson*).

9. **A. polygamus**, *Linn (not of Roxburgh); Thwaites, En. Ceylon Pl., 247.* **A. polygonoides**, *Roxb, Fl. Ind., Ed. C.B.C, 661; Wight, Ic., tt. 512, 719.* **Amblogyna polygonoides**, *Dalz. & Gibs, Bomb. Fl., 219.* **Euxolus polygamus**, *Moq.; Thwaites, En. Ceylon Pl., 248.* Throughout India and Ceylon. "I believe that this can only be ranked as a form of **A. Blitum**, with small usually obovate apiculate leaves, fewer flowers in a cluster, often larger, more subulate sepals and smaller, more acute utricles."

Var.—**angustifolia.** Occurs in the Panjáb and Carnatic.

10. A. tenuifolius, *Willd., Roxb. Fl. Ind., Ed. C.B.C., 660*; *Wight, Ic., t. 718*. Mengea tenuifolia, *Moq.*; *Dals. & Gibs., Bomb. Fl., 218*. Bengal, Gangetic Valley, and Panjab (*Sir J. D. Hooker, l.c., 722.*)

EVODIA, *Forst., Gen. Pl., I, 296.*

Evodia fraxinifolia, *Hook. f.; Fl. Br. Ind., I, 490*, RUTACEÆ. — 575

Vern.—*Kanukoa*, NEPAL; *Kanú*, LEPCHA.

Reference.—*Gamble, Man. Timb., 60.*

Habitat.—A small tree of the Eastern Himálaya in Sikkim, between 4,000 and 7,000 feet, and of the Khásia Hills from 3,000 to 5,000 feet. It is said to emit a strong scent of caraway when bruised.

Structure of the Wood.—White, soft, used only for posts of huts. — TIMBER. 576

E. Roxburghiana, *Benth.; Fl. Br. Ind., I, 487*; *Wight, Ic., t. 204*. — 577

Syn.—E. TRIPHYLLA, *Beddome*; FAGARA TRIPHYLLA, *Roxb.*; ZANTHOXYLUM TRIPHYLLUM, *Thwaites.*

Vern.—*Nebede, lunu, ankenda*, SING.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 139*; *Kurz, For. Fl. Burm., I, 180*; *Gamble, Man. Timb., 60*; *Thwaites, En. Ceylon Pl., 69 & 409*; *Dals. and Gibs., Bomb. Fl., 45*; *Grah., Cat. Bomb. Pl., 36*; *Lisboa, U. Pl. Bomb., 30.*

Habitat.—A small tree found in the Khásia Hills, South India, Tenasserim, and the Andaman Islands; also met with in Ceylon.

Structure of the Wood.—Greyish-brown, moderately hard. — TIMBER. 578

E. triphylla, *DC.; Fl. Br. Ind., I, 488.* — 579

References.—*Kurz, For. Fl. Burm., I, 180*; *Gamble, Man. Timb., 60.*

Habitat.—A small tree much resembling E. Roxburghiana. It inhabits damp localities in Burma and the Andaman Islands, Japan, China, and Borneo.

Structure of the Wood.—"Light, soft, pale-pinkish, close-grained, straight, fibrous, with silvery lustre" (*Gamble*). — TIMBER. 580

EVOLVULUS, *Linn.; Gen. Pl., II, 875.* — 581

Evolvulus alsinoides, *Linn.; Fl. Br. Ind., IV, 220*; [illegible] [illegible]

[illegible]

Habitat.—A prostrate perennial herb, with [illegible] white flowers, found nearly all over India [illegible]

Medicine.—Muhammadan physicians [illegible] power of strengthening the brain and [illegible] used as a febrifuge and tonic. Ainslie says [illegible] complaints. In the Vedic period it was [illegible]

[illegible]

X

flowered form is called *Vishnugrandie*. The other kind has white flowers and is called *Sivagrandie*" (*V. Ummegudiem, Mettapollian, Madras*).

EXACUM, *Linn.; Gen. Pl., II., 803.*

585

Exacum bicolor, *Roxb.; Fl. Br. Ind., IV., 96; Wight, Ic., t. 1321;* [GENTIANACEÆ.

Vern.—*Bará-charáyatah,* HIND.

References.—*Roxb., Cat. Pl. (1813); Dalz. & Gibs., Bomb. Fl., 156, (Syn., excl.); Dymock, Mat. Med. W. Ind., 2nd Ed., 540; Drury, U. Pl., 208; Lisboa, U. Pl. Bomb., 262; Balfour, Cyclop., I., 1067; Clarke, in Journ. Linn. Soc., XIV., 425.*

Habitat.—An erect herbaceous plant, 1 to 2 feet high, frequent in the Deccan Peninsula. Flowers large, white tipped with blue.

MEDICINE. Stalks. 586

Medicine.—The dried STALKS are sold in South India under the name *Country Kariyát*. The plant possesses tonic and stomachic properties, and may well be substituted for *Gentian* (*Pharm. Ind.*).

587

E. pedunculatum, *Linn.; Fl. Br. Ind., IV., 97; Wight, Ic., t. 336.*

Syn.—E. SULCATUM, *Roxb.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 134; Voigt, Hort. Sub. Cal., 520; Thwaites, Enum. Ceylon Pl., 203; Pharm. Ind., 150; Drury, U. Pl., 209; Clarke, in Journ. Linn. Soc., XIV., 427; Edgeworth, Cat. Pl. Banda, 51* (E. rivulare).

Habitat.—A small herb, usually under a foot in height, found throughout India, ascending to 3,000 feet from Oudh and Bengal to Ceylon.

MEDICINE. Plant. 588

Medicine.—The PLANT is less bitter than *Chiretta*, and more so than *Gentian*, for which it may be substituted.

589

E. tetragonum, *Roxb.; Fl. Br. Ind., IV., 95.*

Vern.—*Titakhana, ava* (purple) *chiretta,* HIND.; *Koochuri,* BENG.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 133; Voigt, Hort. Sub. Cal., 520; Grah., Cat. Bomb. Pl., 123; Royle, Ill. Him. Bot., I., 277; Pharm. Ind., 149; O'Shaughnessy, Beng. Dispens., 460; Irvine, Mat. Med., Patna, 81; Balfour, Cyclop., I., 1067; Clarke, in Journ. Linn. Soc., XIV., 424.*

Habitat.—An erect herbaceous plant, 1 to 4 feet high, with deep-blue flowers, found in North India, ascending to 5,000 feet, common from Garhwál to Central India, Bhután, and the Khásia Mountains; also in Bombay, Salsette, Khandalla, Morung, Wurgaum, and Bengal.

MEDICINE. 590

Medicine.—The plant is used as a tonic in fevers and a stomachic bitter (*Pharm. Ind.*).

EXCÆCARIA, *Linn.; Gen. Pl., III., 337.*

The name is said to be derived from *Excæco*, because of the powerfully acrid juice, especially that of E. Agallocha, which causes blindness if applied to the eyes.

591

Excæcaria acerifolia, *Didrichs.; Fl. Br. Ind., V., 473;* EUPHORBIACEÆ.

Vern.—*Básingh,* KUMAON.

References.—*Brandis, For. Fl., 441; Ind. For., XI., 5.*

Habitat.—An evergreen shrub, or small tree found up to 6,000 feet in Kumáon, Nepál, and on the Khásia Hills.

MEDICINE. Leaves. 592

Medicine.—The Bhutias inhabiting East Kumáon use the LEAVES of this plant as a remedy for rheumatism.

593

E. Agallocha, *Linn.; Fl. Br. Ind., V., 472; Wight, Ic., t. 1865 B.*

THE BLINDING TREE.

Vern.—*Gangwa, geor, uguru, geria, goria,* BENG.; *Guua,* URIYA; *Geva,* BOMB.; *Chilla, tella-chettu,* TEL.; *Haro,* KAN.; *Tayau, kayau,* BURM.; *Yekin,* ANDAMANS; *Tella kiriya,* SING.

The Blinding Tree (*J F Duthie*) EXOGONIUM Purga.

References —*Roxb, Fl Ind, Ed C.B C, 713, Voigt, Hort Sub Cal, 161; Brandis, For Fl, 442, Kurz, For Fl Burm, II, 414 Beddome, For Man, 255, Gamble, Man Timb, 368, Dalz & Gibs, Bomb Fl, 227; Rheede Hort Mal, V, t, 45 Elliot, Fl Anthr, 175, Rumph, Amb, II, t 79, 80* (Arbor excæcans), *Ainslie Mat Ind.,*

GUM 594

MEDICINE 595

application being very singular The body of the patient is first rubbed with green leaves, he is then placed in a small room and bound hand and foot, when a small fire is made of pieces of the wood of this tree from which rises a thick smoke; the patient is suspended over this fire, and remains for some hours in the midst of the poisonous smoke and under the most agonizing torture often fainting When throroughly smoked, he is removed, and the slime is scraped from his body, he is then scarified and left to await the result In some cases he is cured, but frequently the patient dies under the ordeal (*Smith, Econ Dic, 5*)

TIMBER. 596

Structure of the Wood —White, very soft, and spongy Grows occasionally to 5 feet in girth and 40 feet in height, though generally cut for posts when of small girth It is a useful wood for general carpentry purposes, such as toys, bedsteads, tables, &c. Roxburgh remarks that it is only used for charcoal and firewood

DOMESTIC 597

Domestic Use.—Fishing floats are made from the roots of the tree

E. baccata, *Müll-Arg*, see Sapium baccatum.

E. indica, *Müll-Arg*, see Sapium indicum

E. insignis, *Müll-Arg*, see Sapium insigne

E. sebifera, *Müll-Arg*, see Sapium sebiferum

Exogonium Purga, *Benth*, see Ipomæa Purga

(G. Watt.)

FABA, *Tourn.; Gen. Pl., I., 525.*

1

Faba vulgaris, *Mœnch.;* LEGUMINOSÆ.

THE BROAD BEAN.

Vern.—*Káiún*, KASHMIR; *Chástang*, SUTLEJ; *Nakshan*, LADAK. *Bákla*, a name given to it in the plains and lower hills of India.

Habitat and Area of Indian Cultivation.—The *Flora of British India* does not allude to this plant, from which fact the inference is unavoidable that it is not regarded as a native of India. But introduced cultivated plants are usually described in the *Flora*, and the absence of any notice of the Field or Broad Bean may be assumed as an indication that it is supposed to be scarcely, if at all, cultivated in this country. It is, however, to a considerable extent, cultivated on the Himálaya, and in Kashmír and Ladak may be regarded as a regular crop. De Candolle says it has no Sanskrit name nor any modern Indian name. From this circumstance he infers that it is of modern introduction into India. The vernacular names given above would, however, seem opposed to this opinion. Mr. Atkinson states that it is cultivated in Kumáon up to 8,000 feet, and that there are two or three varieties raised from "introduced and native seed." Mr. Baden Powell refers to its cultivation in Kashmír and Peshawar. Balfour goes even still further, and affirms that it "is found wild in the Sutlej valley, between Rampur and Sungnam, at an elevation of 8,000 to 14,000 feet." Stewart, while not supporting the verdict that it is a native of the Sutlej valley, speaks of it as a regular crop, adding that "beans are ground into flour for food, and are, on the Sutlej, given to cattle." In the Settlement Report of the Kángra District it is alluded to as a regular spring crop. The Director of Land Records and Agriculture in Bengal, replying to an enquiry regarding this plant, reports that it is "not yet grown as a field crop in the Lower Provinces." The Director in Burma, on the other hand, states that "in Pegu District it is cultivated by the Chinese and Shan gardeners in moderate quantities, but has not been taken up as a field crop. This vegetable finds a ready sale in the market. The plant is said to thrive on any land which can be cultivated during the dry season." In the *Indian Forester* (*Vol. IX., p. 452*) will be found an interesting note on its cultivation in the North-West Provinces. See also in the *Jours. Agri.-Hort. Soc., IV., 7; V., 37.*

For further information consult the article Vicia.

FAGONIA, *Linn.; Gen. Pl., I., 267.*

A genus of branching woody herbs, of so variable a nature that it is difficult to fix the number of species. Two occur in India—one in the North-West, to Peshawar, distributed to Algeria; the other also occurs over Northern India, but shows in India a more westerly tendency, being dispersed through the Panjáb and Sind to Bombay. It is often difficult to determine to which of these species writers on Economic Botany allude, and the statements made below may therefore have to be rearranged in the future.

2

Fagonia arabica, *Linn.; Fl. Br. Ind., I., 425;* ZYGOPHYLLEÆ.

Syn.—FAGONIA MYSORENSIS, *Roth.; Wall., Cat., 6853;* F. CRETICA, var. ARABICA, *Dalz. & Gibs.*

Vern.—*Usturgar, ústarkhár*, HIND.; *Jowasa* (Ajmere), RAJ.; *Drummahú* (or *drammaho*), SIND.; *Dhamásá, dumaso*, MAR.; *Dhamaso*, GUZ.; *Dusparsha*, SANS.; *Bádávard*, PERS.

References.—*Dalz. & Gibs., Bomb. Fl., 45; Aitchison, Cat. Pb. and Sind Pl., 27; Aitchison's Report, Del. Com. Afg., 44; Pharmacog. Ind., I., 246; Dymock, Mat. Med. W. Ind., 2nd Ed., 120; S. Arjun, Bomb. Drugs, 27; Murray, Pl. and Drugs, Sind, 91; Baden Powell, Pb. Pr., 335; Stocks, Account of Sind; List of Drugs exhibited by Baroda Durbar*

at Cal Inter Exh ; Gazetteers, Mysore and Coorg, I, 56, Agra, IV., ... XII (App.) 7 8

India, Sind, the Panjáb, and the ... ninsula Spines shorter than the

MEDICINE. Leaves. 3 Twigs. 4

Medicine —Dr Stocks was the first writer apparently who made the medicinal properties of this plant known to Europeans He says "The LEAVES and TWIGS are supposed to have cooling properties, and, according to the Arabian system of medicine, must be good against all disorders arising from heat (external and internal) They are much used as prevent-

... strong term ...

Juice. 5

6

Fagonia Bruguieri, *DC.; Fl Br. Ind, I, 425*

Syn.—F CRETICA, *var ?, T Anders*

Vern —*Damáhán (or dam-áhár*=carried by the wind), HIND, *Spalaghzái aghzái*, TRANS INDUS, *Dhamá (or dhámáh), damá, damiyá dramah dhamanh*, PB and SIND; *Dhamaso*, GUZ; *Badawurd* (=carried by the wind), PERS

References —*Stewart, Pb Pl, 37; Baden Powell, Pb, Pr, 335, Settl Rep, Montgomery, 20; Gaz, Muzaffargarh, 27, Gaz, Agra (IV), LXIX*

... North-West India to Peshawar and distributed ...

MEDICINE. Plant. 7

[A No 1665, SALVADORACEÆ.

F. montana, *Miq*, see Azima tetracantha, *Lam, Dic Econ Prod, Vol I,*

FAGOPYRUM, *Gartn ; Gen Pl, III, 99*

8

Fagopyrum cymosum, *Meissn ; Fl Br Ind, V, 55 ;* POLYGONACEÆ.

Syn.—FAGOPYRUM TRIANGULARE, *Meissn*, F. EMARGINATUM, *var* KUNAWARENSE, *Meissn ;* POLYGONUM CYMOSUM, *Trevivan ;* P. *nec* TRIANGULARE, *Wall ;* P EMARGINATUM, *Wall ;* P DIBOTRYS, *Don ;* P. VOLUBILE, *Turcz ;* P RUGOSUM, *Ham*

Vern.—*Banogal* (Sutlej Valley), PB

References.—*Stewart, Pb Pl., 183; Atkinson, Him Dist., 316*

Habitat.—A tall, delicately-branched annual, growing on perennial roots This appears to be the wild plant from which, perhaps both, or at least one

of the species of BUCKWHEAT has been derived. It occurs on the temperate Himálaya, frequenting glades between 5,000 and 11,000 feet in altitude. It is distributed from Kashmír to Sikkim and the Khásia Hills. Mr. Atkinson calls this the *ban* (wild) *-ogal*, and adds that in Kumáon it occurs wild on the lower hills.

FOOD. 9

Food and Fodder.—Although eaten as fodder by cattle, it is commonly reported that this species is not used for any economic purpose. It is, however, so much like **F. esculentum** that it is often doubtful, when in flower, whether the plants met with in glades, near fields, are truly wild, or only escapes from cultivation.

10

Fagopyrum esculentum, *Mœnch.; Fl. Br. Ind., V., 55.*

THE BUCKWHEAT OR BRANK.

Syn.—FAGOPYRUM EMARGINATUM, *Meissn.*; POLYGONUM FAGOPYRUM, *Linn.*; P. DIOICUM, *Ham. MS.*; P. EMARGINATUM, *Roth.*

Vern.—*Phaphra, kotu, kúltú,* HIND.; *Doron,* ASSAM; *Titaphapur* [Darjiling], NEPAL; *Bhe, pálti,* BHUTIA; *Kotu,* GARHWAL; *Pháphar, ogul,* KUMAON; *Daráu, obal, phúlan, ogal, pháphar,* PB.; *Phaphra, úgla, pagua, kathu, dhanphari,* SIMLA; *Bares katú,* KANGRA; *Kathu, brés,* KULLU; *Tramba shirin,* KASHMIR.

See the note on the vernacular names of F. TATARICUM.

References.—*O'Shaughnessy, Beng. Dispens., 523; Church on Food-grains of Ind., 114; Baden Powell, Pb. Pr., 244; Atkinson, Him. Dist., 698; McCann, Dyes and Tans, Beng., 143; Crookes, Handbook, Dyeing and Calico Printing, 412; Report, Nilghiri Hills, by W. R. Robertson, 22; Smith, Dic., 67; Settle. Report of Simla* [*App.*], *XLI; Settle. Report, Kumaon* [*App.*], *32nd; Settle. Report, Kangra, 25; Assam—Note on Condition of the People of; W. R. Robertson in Report, Agri. Dept., Madras, 1878, pp. 136–137; Gazetteers: Kangra, I., 153; II., 57; Mysore and Coorg, I., 65.*

Habitat.—Extensively cultivated on the Himálaya from Western Tibet to Sikkim, the Khásia Hills, Manipur, and the Nilghiri Hills.

There would appear to be many very distinct varieties, some with white, others with pink, flowers. All are more robust and stunted than **F. cymosum**, but it seems probable that every intermediate condition exists between these two species. A form occurs which seems to correspond to the **F. emarginatum** as described by **Stewart**, but the writer, not having the opportunity of studying specimens of the various cultivated plants, can do no more than suggest the necessity for such a study. When finally determined, the vernacular synonyms will have to be rearranged. Indeed, so confused are the names given to the forms of Buckwheat, that it is impossible to assign distinctive vernacular terms for two so widely different plants as **F. esculentum** and **F. tataricum**. The latter is a much coarser plant, grows at higher altitudes, and the nut has the angles rounded off instead of being sharp.

CULTIVATION. 11

Cultivation.—On the Himálaya between 4,000 and 10,000 feet **F. esculentum** is a rainy season crop, being sown in July and reaped in October. The forms met with at lower elevations are stunted, and have thick swollen stems of a red shining colour, with pink flowers. In experimental cultivation at the Saidapet Farm, Madras, Buckwheat from Australian seed was sown on the 9th November: it was irrigated several times, and yielded on the 21st January 167℔ of grain and 1,138℔ of straw per acre. But Mr. Robertson did not apparently form a favourable opinion of Buckwheat as an auxiliary corn-crop. "We have," he adds, "several indigenous grain and pulse crops equal, for ordinary cultivation, to the Buckwheat, if only the ryots could be induced to manure and cultivate better." Mr. Atkinson, speaking of Kumáon and Garhwál, says that Buckwheat "is grown chiefly as a vegetable in the hills and is

recognisable by its red flowers It is frequently sown in newly-cleared forest lands and ripens in September The grain is exported to the plains under the name *Kotu*, and is eaten by the Hindus during their fasts (*bart*), being one of the *phalahas* or food-grains lawful for fast-days It is said to be heating but palatable, and is sold by the *pansárs* or druggists, and not by the general grain dealers" Stewart remarks under F. emarginatum that he thinks there are at least three cultivated species in the

CULTIVATION.

Phalahas. 12

Pot-herb. 13

Dye.—Dr. McCann mentions having received from Darjiling a "sample of woollen yarn dyed a light purple by *tilaphapur* (Buckwheat) ... alluded to was iden ... Crookes gives an ... examining Buck. ... xtracted from the ... his dye yields on ... tained by adding ... le hot and adding

DYE. 14

F ... The ... are boiled as a pot-herb, and ... The ... As an ... out 20 ... ation Professor ... r to have been an ... The table given ... seem desirable to ... o chemical examination.—

FOOD. Leaves. 15 *Shoots.* 16 *Nuts* 17

	In 100 parts	In 1 lb
Water	13 4	2 oz 63 grains
Albuminoids	15·2	2 „ 189 „
Starch	63 6	10 „ 77 „
Oil	3 4	0 „ 238 „
Fibre	2 1	0 „ 147 „
Ash	2 3	0 „ 161 „

From this result Professor Church concludes that the nutrient-ratio is 1 · 4 7 and the nutrient-value 86

Mr. Baden-Powell says · "The seeds yield a hard, bitter, and unpalatable BREAD, which is said to be heating: it is only eaten in the plains during the *bart* or fast days"

Bread. 18

Fagopyrum tataricum, *Gærtn ; Fl Br. Ind , V , 55.*

19

Syn.—F ROTUNDATUM, *Bab.* ; POLYGONUM TATARICUM, *Linn*

Vern —*Kaspat* [bazar name], HIND , *Kála trámba, chín, karma bres, kálá. brapá, drawo, phaphra, ulgo, ugal, tsábri, káthá*, PB , *Tráo, rjao*, LADAK

Note.—On the lower Himálaya it would appear the name *Ogal* or *Ugal* is practically restricted to this species, and *phaphra* given to F. esculentum.

References.—*Stewart, Pb Pl , 184 ; Atkinson, Him. Dist , 316, 698 ; Church, Food Grains of India, 114*

Habitat.—Cultivated throughout the higher Himálaya, but more

especially on the western extremity and at altitudes from 8,000 to 14,000 feet. It is a taller, much coarser plant than F. esculentum, and the nuts, which are long and not triangular, have the angles rounded off and keeled towards the top. It seems probable that there are several varieties, the nut in some being less than half the size in others.

CULTIVATION. 20

Cultivation.—This seems to be the form grown in Ladak, Zanskar, and Western Tibet. In the Simla neighbourhood it is never seen below 9,000 feet.

FOOD. Nuts. 21

Food.—There seems to be little or no difference in taste between this and the previously described species. Stewart says, however, that, if anything, this is inferior in point of quality. Bears are said to be more fond of it than almost of any other food, and they commit much damage to the standing crop. In Lahoul, Aitchison states that "the LEAVES are much used as a pot-herb in summer, when other greens are not easily got."

Leaves. 22

Professor Church writes: "An imperfect chemical analysis of the fruits or unhusked seeds of the present species shows it to resemble very closely the common kind cultivated in Europe, the albumenoids being 10·9 per cent., the oil 2·4, and the ash 7:" he adds, "the percentage of albumenoids and oil would be considerably raised by the removal of the husk."

FAGRÆA, *Thunb.; Gen. Pl., II., 794.*

23

Fagræa fragrans, *Roxb.; Fl. Br. Ind., IV., 85;* LOGANIACEÆ.

Vern.—*Anan* (or *a-nan*), BURM.

References.—*Roxb., Fl. Ind., Ed. Carey & Wall., II., 32; Kurz, For. Fl. Burm., II., 205; Gamble, Man. Timb., 267; Mason, Burma and Its People, 543, 802; Pharm. Ind., 146; Moodeen Sheriff, Supp. Pharm., Ind., 138.*

Habitat.—A small evergreen tree of Burma and the Andaman Islands to China.

MEDICINE. Bark. 24

Medicine.—The BARK of this plant is said to be a remedy for malarious fever. In experiments made by Dr. Kanny Lall De, C.I.E., it was found to contain strychnia. The *Pharmacopœia of India* remarks "the remedy appears worthy of further investigation."

TIMBER. 25

Structure of the Wood.—Hard, brown, close-grained, beautifully mottled. It is very durable, and is not liable to the attacks of the "Teredo." It is one of the most important of the reserved trees of Burma, especially in Tavoy; and is used for house-building, bridge and wharf piles, boat anchors, and other purposes. Weight from 53 to 70lb a cubic foot.

SACRED USES. 26

Sacred Uses.—The Burmese regard the wood of this tree as too good for the laity, and hold that it should be reserved for sacerdotal purposes. At Tavoy it is employed principally for the posts of Buddhist edifices (*Mason*).

27

F. obovata, *Wall.; Wight, Ic., t. 1316, 1317; Fl. Br. Ind., IV., 83.*

Vern.—*Sunakhari,* NEPAL; *Longsoma,* MAGH.; *Nyoungkyap* (*nyaung-gyat*), BURM.

References.—*Kurz, For. Fl. Burm., II., 205; Gamble, Man. Timb., 267; Thwaites, En. Ceylon Fl., 200; Rheede, Hort. Mal., 4, tab. 58; Indian Forester, II., 25; X., 34; Bombay Gazetteer (Kánara), XV., Pt. I., 438.*

Habitat.—An evergreen tree, often scandent or stem-clasping, found in the forests of the Deccan Peninsula and in Northern and Eastern Bengal, the Khásia Hills, Chittagong, and Burma.

In Burma it is said to be characteristic of the lower hills, and it is also reported to be one of the most beautiful plants found on the lower slopes of the Nilghiris. It is common in the forests of North Kánara, flowering during the rainy season. In Burma the fruit ripens in the cold season.

TIMBER. 28

Structure of the Wood.—Hard and durable. Weight 56lb.

Fagræa racemosa, *Jack.; Fl. Br. Ind, IV., 84.* — 29

Vern.—*Thit-hpaloo,* BURM.

References.—*Kurz, For. Fl. Burm, II, 205; Gamble, Man. Timb., 268.*

Habitat.—A moderate-sized evergreen tree, frequent in the forests of the Andaman Islands, and distributed to Penang and Malacca. It flowers and fruits from February to May.

MEDICINE. Root-Bark. 30

Medicine.—Major Ford says that the ROOT-BARK is used as a cure for fever (*Gamble*).

TIMBER. 31

Structure of the Wood.—Moderately hard, greasy to the touch, and with a scent like that of india-rubber. Weight 50lb per cubic foot. Major Ford remarks that it is strong and durable, and that the wood is used for house-posts.

Fagus sylvatica, the BEECH; not indigenous to India.

FAMINE FOODS.

32

[illegible]

foods. It is commonly stated that the low-caste people have a superabundance of food during famines, since they eat the animals that have died of starvation. The higher-caste Hindus will not do so but prefer rather to die.

Abrus precatorius.—The *Rati* seeds. These are poisonous if a powder prepared from them be injected under the skin, but boiled as a pulse they are wholesome, and in Egypt are regularly cultivated as an article of diet.

Abutilon indicum.—*Behar Famine.*

A. muticum.—Seeds. *Dec. Fam.*, see also *Lisboa, U. P. B., p. 194.*

Acacia arabica.—Seeds. *Dec. Fam.*; see *Lisboa, U. P. B., p. 197.* The gum and powdered bark are also largely eaten in famine.

A. leucophlœa.—Bark ground into flour and young pods. [illegible]

Acalypha indica.—Leaves. *Lisboa, U. P. B., p. 2[illegible]4;* [illegible] *III, 275.*

Achyranthes aspera. Leaves and seeds. *Dec. Fam.* See also *Lisboa,* [illegible]

[illegible]

Alangium decapetalum.—Fruit. *Dec. Fam.*

Allophyllus Cobbe (Schmidelia).—Fruit. [illegible]

[illegible]

Famine Foods.

Albizzia procera.—*Lisboa, U. P. B., p. 199.*
Aloe vera, *var.* officinalis.—Leaves. *Shortt, Ind. For., III., 235.*
A. indica.— } The leaf—bud or cabbage. *Lisboa, U. P. B., p. 206.*
A. litoralis.— }
Alpinia Galanga.—Tubers. *Dec. Fam.*
Altenanthera sessilis.—Leaves. *Shortt, Ind. For., III., 235.*
Alysicarpus rugosus.—Seeds. *Lisboa, U. P. B., p. 198.*
A. vaginalis.—Herb. *Dec. Fam.*
Amarantus gangeticus (A. tristis).—Herb. *Shortt, Ind. For., III., 235.*
A. oleraceus.—Herb. *Dec. Fam.*
A. paniculatus.—Herb. *Shortt, Ind. For., III., 235.*
A. spinosus.—Leaves. *Bengal Famine. Shortt, Ind. For., III., 235.*
Amorphophallus campanulatus.—Tuber. *Lisboa, U. P. B., p. 207; Shortt, Ind. For., III., 235.*
A. sylvaticus.—Tuber and leaf. *Dec. Fam.*
Andropogon pertusus.—One of the best grasses to withstand long droughts, hence a cattle-famine fodder, though largely eaten at other times.
Anthocephalus Cadamba.—Fruit. *Dec. Fam.*
Arisæma curvatum.—Roots. *Lisboa, U. P. B., p. 207.*
Arthrocnemum indicum.—Herb, pickled. *Dec. Fam. Shortt, Ind. For., III., 238.*
Arundinaria Wightiana. *Lisboa, U. P. B., p. 209.* Rice, from the flowering stem, formed the principal food of the poor during the famine of Orissa in 1812; of Kánara in 1864; and of Malda, 1866.
Asparagus sarmentosus.—Roots. *Dec. Fam.*
Asphodelus fistulosus.—The Piazi, the tubers of which are, in the Panjáb, eaten in times of scarcity. Stewart says this appears to have been the plant alluded to by Griffith as eaten by the camp followers of the Kandahar Force when provisions ran scarce.
Asterocantha longifolia.—Herb. *Dec. Fam.*
Asystacia gangetica.—Vegetable. *Lisboa, U. P. B., p. 202.*
Atriplex hortensis.—Herb. *Shortt, Ind. For., III, 235.*
Bamboo seeds.—Saved thousands in the Orissa Famine of 1812; Kánara of 1864, when 50,000 people went to Dharwar and Belgaum to collect the seeds, Malda, of 1866; &c., &c.
Bambusa arundinacea.—Seeds. *Dict. Ec. Prod., Vol. I., p. 391.*
B. vulgaris.—*Lisboa, U. P. B., p. 209.*
Bassia latifolia.—Fruit and also flowers when dried in the sun are eaten normally by the hill tribes, but in times of scarcity by all classes. *Shortt, Ind. For., III., 235.* Lisboa writes:—"During the famine of 1873-74 in Behar this is said to have kept thousands of people from starvation."
B. longifolia.—Seeds and flowers. *Lisboa, U. P. B., p. 201.*
Bauhinia malabarica.—Leaves. *Dec. Fam.* Largely eaten as a vegetable by the hill tribes.
B. racemosa.—Flowers. *Dec. Fam.*
Betula acuminata.—The inner bark is eaten by the Lahupás of Manipur. *Dic. Ec. Prod., Vol. I., 451.*
Bœrhaavia diffusa.—Herb. *Dec. Fam.* Revd. A. Campbell says the Santals grow the plant. *See Vol. I., 485.*
B. repanda.—Leaves. *Lisboa, U. P. B., p. 203; Shortt, Ind. For., III., 235.*
Borassus flabelliformis.—Roots. *Vol. I., 502;* also *Lisboa, U. P. B., p. 207; Shortt, Ind. For., III., 235.*
Boswellia serrata.—Flowers and seeds eaten by the Bhíls. *Vol. I., 516.* Drury says the Uriyas make a soup from the fruits in times of famine.
Brassica.—Mustard, Rape, &c. The leaves of these plants are eaten in times of famine. *Fam. Com. Rept.*

[illegible]

Butea frondosa.—Roots *Dec Fam*
Caladium ovatum.—Herb *Dec Fam*
Canna indica.—Roots yield a useful arrowroot *Vol II, 102*
Canthium parviflorum.—Leaves *Dec Fam Shortt Ind For, III, 236* eaten also in normal seasons, *Vol II, 129*
Carallum adscendens —Shoots cooked *Shortt, Ind For, III, 236*
C fimbriata —Green follicles *Dec Fam Vol II, 141*
Cardiospermum Halicacabum —Herb *Dec Fam Shortt, Ind For, III, 236 Lisboa U P B, p 197 Vol II, 156*
Carissa Carandas & C spinarum —Fruits *Shortt, Ind For, III, 236*
Carthamus tinctorius —Leaves and seeds *Dec Fam* The rich ate the seeds during the famine at Sholapur *Vol II 195*
Caryota urens, *Willd* The farinaceous part of the trunk was largely used in the famine of 1830 (*Roxb., Ed C B C, 668*) *Vol II 208*
Cassia auriculata —Leaves *Dec Fam* also *Lisboa, U P B p 198, Vol II, 216*
C Fistula.—Flowers largely eaten by the Santals (*Rev A Campbell*) *Shortt, Ind. For, III, 236*
C occidentalis —Leaves *Lisboa, U P B, p 198*
C pumila —Herb *Dec Fam*
C Sophora —Leaves *Lisboa U P B, p 198 Shortt Ind For, III, 236* The disagreeable smell and flavour is removed by boiling
C siamea —Leaves *Dec Fam*
C Tora.—Leaves *Dec Fam Stewart Pb Pl 62* also *Lisboa, U P B, 198* ' Largely used during famine, but eaten also at all seasons especially during the month of *Shrâwan* The seeds afford a good substitute for coffee" *Vol II, 226*
Celosia argentea —Herb *Dec Fam*, Stewart says that in the Panjáb it is used as a pot herb in times of scarcity
C cristata —Leaves and shoots *Shortt, Ind For, III, 236 Vol II, 241*
Cenchrus echinatus —Seeds *Vol II, 246*
Cephalandra Indica—Cephalostachyum capitatum, *Munro* GRAMINEÆ *Vol II, 257*
Ceropegia bulbosa.—Root *Dec Fam Vol II, 262*
Chenopodium album.—Herb *Dec Fam*, also regularly cultivated *Vol II, 265*
Chlorophytum parviflorum —Leaves *Dec Fam Comp with Vol II, 269 270*
Chrysopogon montanus —The seeds of this grass are eaten in Rájputana *Vol II 274*
Cicer arietinum —Gram The leaves and stalks are eaten in times of famine *Fam Com Rep*
Clerodendron serratum —Herb *Dec Fam Vol II, 375*
Cleome viscosa.—*Shortt, Ind For, III, 236*
Cocculus villosus —Leaves *Dec Fam Vol II, 398*
Coffee pulp —See *Vol II, 489*
Coix lachryma – Seeds *Dec Fam* The *Kew Bulletin for 1888 p 267*, [illegible] e writer's specimens [illegible] the Kew authorities [illegible] It seems probable [illegible] ng the more readily

FAMINE Foods.

Famine Foods.

recognisable cultivated state of the other (*Comp. with Vol. II., pp. 491—500*).

Commelina bengalensis.—Leaves. *Stewart, Pb. Pl., 236.*

C. communis.—Seeds. *Lisboa, U. P. B., p. 206.*

C. obliqua.—Leaves eaten in famine. (*Atkinson.*)

Corchorus trilocularis.—Herb and seeds. *Dec. Fam.;* also given by *Lisboa, U. P., p. 195.*

C. olitorius.—Herb. *Lisboa, U. P. B., p. 195.*

Cordia obliqua.—Flowers and fruit. *Dec. Fam.*

C. Myxa.—Fruit. *Dec. Fam Shortt, Ind. For., III., 236.*

Corypha umbraculifera. Yields starch from the pith. *Vol. II., 575.*

Cressa cretica.—Herb. *Dec. Fam. Vol. II., 588.*

Crinum defixum.—The bulbous root. *Lisboa, U. P. B., p. 204; Vol. II., 590.*

Crotalaria juncea.—Leaves and pods. *Dec. Fam. Vol. II., 613.*

Curcuma caulina.—Tubers. *Dec. Fam. Vol. II., 658.*

C. pseudomontana.—Tubers. *Dec. Fam. Vol. II, 669.*

Cyanotis axillaris.—Seeds. *Dec. Fam.;* also *Lisboa, U. P. B., p. 206.*

Cycas circinalis, pectinata, & Rumphii.—Yield starch from the interior of the stem.

Cynanchum pauciflorum.—The leaves eaten in Ceylon: this does not appear to be known in India. *Vol. II., 678.*

Cynodon Dactylon.—Leaves and culms. *Lisboa, U. P. B., p. 208; Shortt, Ind. For., III., 236.*

Cyperus jeminicus.—Tuber and leaf. The former are ground into flour and eaten (*Vol. II., 685*). (*Roxb., Fl. Ind., Ed. C.B.C., 65.*)

Dalbergia paniculata.—Leaves. *Dec. Fam.*

Daucus Carota.—Recommended as an emergent crop in times of threatened famine. *Fam. Com. Rep., Vol. II., 151; Conf. also with Vol. III. of this work, pp. 48—52.*

Dendrocalamus strictus.—Male bamboo. The seeds and shoots. *Vol. III., 77.*

Digera arvensis.—Herb. *Dec. Fam. Vol. III., 112.*

Dillenia indica.—Calyx. *Dec. Fam. Vol. III., 113.*

Dioscorea anguina.—This, according to Roxburgh, yields a tuber which is eaten in times of famine.

D. oppositifolia.—Tubers. *Dec. Fam.*

D. pentaphylla.—Leaves, tubers, and flowers. *Dec. Fam.*

D. triphylla.—Tubers. *Dec. Fam.*

Diospyros Embryopteris.—Fruit. *Dec. Fam.*

Dolichos biflorus—Is spoken of by Roxburgh as a crop that requires little rain, and may, therefore, be grown when rice fails.

Dracontium polyphyllum (see *Vol. II., p. 192*)—Is said by Drury (*U. P., 187*) to afford a tuber which is eaten in times of famine. *Shortt, Ind. For., III., 236.*

Dregea volubilis.—Leaves. *Shortt, Ind. For., III., 237.*

Ehretia lævis, *Roxb.* Fruit and inner bark. *Stewart, Pb. Pl., 153; Lisboa, U. P. B., p. 202.*

Elæagnus latifolia.—Fruit. *Dec. Fam.*

Eleusine ægyptiaca.—Seed-grains. *Lisboa, U. P. B., p. 268.*

Embelia robusta.—Leaves. *Dec. Fam.*

Erinocarpus Nimmoanus.—Fruit. *Dec. Fam.*

Eriodendron anfractuosum.—Seeds. *Lisboa, U. P. B., p. 195; Shortt, Ind. For., III., 236.*

Erythroxylon monogynum.—Leaves and young shoots. *Lisboa, U. P. B., p. 195.* Said to have afforded food to many thousand people during the famine in Madras of 1877. *Shortt, Ind. For., III., 236-238.*

Eugenia Jambolana.—Kernels. *Shortt, Ind For., III, 238*

Euphorbia pilulifera. (*Hirta Dalz & Gibs*)—Leaves. *Lisboa, U P B., p 203 Shortt Ind For, III, 236*

E thymifolia.—Herb. *Dc Fam*

Feronia elephantum.—Fruit. *Dec Fam*

Ficus bengalensis —Fruit *Lisboa U P B, 204 Shortt, Ind For., III, 236*

F glomerata.—Fruit. *Dec Fam Lisboa U P B, 204. Shortt, Ind For, 236*

F indica.—*Fam Com Rep., Vol II, p 15, C P*

F. religiosa.—Fruit. *Dec Fam Lisboa, U P B, 204, Shortt, Ind For., III., 236*

Fimbristylis Kysoor, *Roxb, Dalz & Gibs, Bomb Fl., 288* The tuberous root. *Lisboa, U P B p 208*

[illegible]

For III, 236

Gynandropsis pentaphylla.—Leaves. *Shortt, Ind For, III, 236 237*

Hedychium coronarium (also H scaposum, *Nimmo Dalz & Gibs Bomb Fl 273*)—Tubers *Dec Fam*

Helmia, see Dioscorea.—Tubers *Dec Fam*

Hibiscus tiliaceus —Bark *Lisboa U P B, p 194* Drury quoting Forster, states that the stalks are sucked in times of scarcity

Holostemma Rheedii.—Flowers *Dec Fam Shortt Ind For III 23[illegible]*

Hoya viridiflora = Dregea volubilis —Leaves *Dec Fam*, also mentioned by *Lisboa U P B, p 201*

Indigofera cordifolia.—Seeds *Dec Fam*; also mentioned by *Lisboa, U P B, p 197* "A highly nitrogenous pulse."

I enneaphylla.—Seeds *Dec Fam.*

I glandulosa.—Seeds *Dec Fam*, [illegible] *p 197* "Rich in nitrogen" [illegible] species are made into bread in [illegible] *Fl Ind Ed C B C, 583*)

I linifolia.—Seeds *Dec Fam* [illegible] *p 197* "Seeds largely c[illegible] Sholapur, Ahmednagar, &c [illegible] or with some cereals [illegible]"

Ipomæa aquatica.—Herb. [illegible] *Ind For, III, 237*

I eriocarpa, *Br.*—[illegible]

I muricata.—[illegible]

I reniformis.—[illegible] *Ind For III* [illegible]

I sepiaria.—[illegible] *Ind For III* [illegible]

Jasminum [illegible]

Launæa [illegible]

Leea [illegible]

Leptadenia [illegible] *III., 2*[illegible]

Leucas [illegible] *For.,* [illegible]

[illegible]

FAMINE
Foods.

Famine Foods.

Leucas cephalotes.—Herb. *Dec. Fam.; Behar Famine.*
Limnanthemum cristatum.—Stems and fruit. *Shortt, Ind. For., III., 238; Lisboa, U. P. B., p. 202.*
Linum usitatissimum.—Green pods. *Dec. Fam.*
Maba buxifolia.—Fruit. *Shortt, Ind. For., III., 237.*
Macaranga Roxburghii.—Fruit. *Dec. Fam.*
Malva parviflora, *Linn.*—A pot-herb eaten largely in famine.
Mangifera indica.—Kernels used in times of scarcity and famine. *Roxb., Fl. Ind., Ed. C.B.C., 216; Shortt, Ind. For., III., 237.*
Melia Azaderachta.—Fruit. *Lisboa, U. P. B., p. 196; Shortt, Ind. For., III., 237.*
Mengea (Amarantus) tenuifolia.—Herb. *Dec. Fam.*
Mimusops Elengi.—Fruit. *Shortt, Ind. For., III., 237.*
M. hexandra.—Fruit. *Dec. Fam.*
Mirabilis Jalapa.—Leaves. *Lisboa, U. P. B., p. 203; Shortt, Ind. For., III., 237.*
Mollugo stricta.—Herb. *Dec. Fam.*
Momordica Charantia.—Leaves. *Dec. Fam.*
Morinda citrifolia.—Green fruit. *Shortt, Ind. For., III., 237.*
M. umbellata.—Fruit. *Lisboa, U. P. B., p. 200; Shortt, Ind. For., III., 237.*
Mucuna pruriens.—Seeds. *Dec. Fam.*
Murraya Kœnigii.—Fruits. *Shortt, Ind. For., III., 235.*
Musa ornata.— } **M. superba.**— } Root. *Dec. Fam.* Also mentioned by *Lisboa, U. P. B., 204.* "The scape and the convolute leaf-sheaths of both these plants."
Mussænda frondosa.—Flowers. *Dec. Fam.*
Nelumbium speciosum.—Root. *Dec. Fam.*
Neptunia (Desmantus) oleracea.—Herb and pods. *Lisboa, U. P. B., p. 199; Shortt, Ind. For., III., 236.*
Nymphœa lotus.—Roots and seeds. *Shortt, Ind. For., III., 237.*
N. stellata, *Willd.*—Roots and seeds.
Olea dioica.—Fruit. *Dec. Fam.*
Opuntia Dillenii.—Fruit. *Lisboa, U. P. B., p. 199.*
Orygia decumbens.—Leaves. *Lisboa, U. P. B., p. 200; Shortt, Ind. For., III., 233—237.*
Oxalis corniculata.—Seeds. *Dec. Fam.* Leaves. *Lisboa, U. P. B., p. 196; Shortt, Ind. For., III., 237.*
Oxystelma esculentum.—Follicle. *Dec. Fam.*
Pachyrhizus angulatus.—The tuberous root.
Pandanus odoratissimus.—Pulpy part of drupes (*Roxb., Fl. Ind., Ed. C.B.C., 707*), eaten in times of famine; *Shortt, Ind. For., III., 237.*
Panicum colonum.—Seeds. *Dec. Fam.*
P. frumentaceum. Should be extensively cultivated in seasons of drought, as with little irrigation, on any light soil, it will afford a harvest within six weeks of the date of sowing. *Fam. Com. Report, II., 151.*
Penicillaria spicata (Holcus spicatus, *Dalz. & Gibs.*). *Lisboa, U. P. B., 208.*
Phaseolus adenanthus.—The tuberous roots. *Shortt, Ind. For., III., 237.*
P. Mungo—Is, by **Roxburgh,** spoken of as a crop that will grow in times of threatened famine, when rice fails.
P. trilobus.—Seeds. *Dec. Fam.*
P. trinervius.—*Lisboa, U. P. B., p. 198.* "Seeds rich in nitrogenous principle."
Phœnix farinifera.—The farinaceous substance in the trunk (*Roxb., Fl. Ind., Ed. C.B.C., 723*) (*Drury, U. P., 339*). Leaf-bud. *Shortt, Ind. For., III., 237.*
P. sylvestris.—Fruit. *Dec. Fam.* Also leaf-bud or cabbage. *Lisboa, U. P. B., p. 206; Shortt, Ind. For., III., 237.*

Famine Foods (G Watt) | FAMINE Foods.

Pistia stratiotes —Herb *Dec Fam* 37

Portulaca oleracea.—Shoots *Shortt, Ind For, III, 237*
Pouzolzia tuberosa.—The tuberous roots *Lisboa, U P B, 204*
Premna latifolia.—Leaves *Lisboa, U P B, p 202 Shortt Ind For, III, 237*
P integrifolia.—Leaves *Lisboa, U P B, 203 Shortt Ind For, III, 237*
Prosopis spicigera *Linn*—Pods *Dec Fam Shortt, Ind For, III, 237*
Pteris aquilina —The underground stems
Pterocarpus Marsupium.—Seeds and flowers *Dec Fam*
Randia uliginosa —Green fruit *Dec Fam*
Ranunculus sceleratus —This is eaten by the inhabitants of Wallachia when cooked It is a powerful poison when not cooked
Rhynchocarpa fœtida —Fruit and leaves *Lisboa, U P B, p 200 Shortt, Ind For, III, 235*
Rivea hypocratenformis —Leaves. *Lisboa, U P. B, p 202, Shortt,*

B, p 197 Shortt,

being cultivated for
pecies in India, but
no record exists of their being eaten
Salicornia brachiata —Leaves and shoots *Shortt, Ind For, III, 238*
Salsola fœtida.—Herb *Dec Fam*
Santalum album —Seeds *Lisboa, U P B, p 204*
Schleichera trijuga.—Fruit *Dec Fam Shortt, Ind For, III, 238*
Schrebera swietenioides —Leaves *Dec Fam*
Semecarpus Anacardium.—Green fruit *Dec Fam*
Sesamum indicum.—Seeds made into oil cake
Sesbania aculeata.—Seeds. *Dec Fam*
S ægyptiaca.—Seeds highly nitrogenous *Lisboa, U P. B., p 197*
S procumbens —Seeds *Dec Fam*
S grandiflora.—*Shortt, Ind For, III, 235*
Sesuvium Portulacastrum —Seeds and herb *Dec Fam*
Shorea robusta.—Seeds roasted and mixed with the flowers of the Mahua tree
Sida cordifolia.—Herb *Dec Fam*
Smilax ovalifolia.—Leaves and root *Dec Fam*
Smithia sensitiva.—Herb *Dec Fam*
Solanum Jacquinii —Unripe fruit curried *Lisboa, U P B., p 202*
S nigrum & xanthocarpum.—Herb *Dec Fam Shortt, Ind For, III., 238 Lisboa U P B, 202*
S torvum.—Curried. *Lisboa, U P B, 202, Shortt, Ind For, III, 238*
Sorghum vulgare (Holcus saccharatus, *Dalz & Gibs*)—*Lisboa, U P. B, p 208*
Spathium chinense (Aponageton monostachyon) —Tubers are boiled and eaten *Shortt Ind For III, 235*
Spermacoce hispida.—Seeds *Dec Fam* Rev A Campbell mentions

S guttata.—Seeds. *Dec Fam*

Strychnos potatorum.—Fruit. *Shortt, Ind. For., III., 238.*
Suæda maritima & nudiflora.—Leaves. "The leaves of this plant alone, the natives say, saved many thousand lives during the famine of 1791, 1792, and 1793." *Roxb., Fl. Ind., Ed. C.B.C., 262; Shortt, Ind. For., III., 238.*
Synantherias sylvatica.—Root, petioles, and leaves. *Lisboa, U. P. B., 208.*
Syzygium Gibsonii. (Eugenia *sp.?*)—Fruit. *Dec. Fam.*
Tacca pennatifida.—Root. *Dec. Fam.*
Tamarindus indica.—Leaves and seeds. *Dec. Fam. Roxb., Fl. Ind., Ed. C.B.C., 531; Shortt, Ind. For., III., 233—238.*
Tephrosia purpurea.—Seeds. *Dec. Fam.*
Terminalia belerica.—Seeds. *Dec. Fam* Gum eaten by the Santals.
Theriophonium Dalzelii.—Leaves and petioles. *Lisboa, U. P. B., p. 208.*
Toddalia aculeata.—Leaves. *Shortt, Ind. For., III., 238.*
Trapa bispinosa.—Seeds. *Shortt, Ind. For., III., 238.*
Trianthema crystallina.—Seeds.
T. monogyna.—Leaves and shoots. *Shortt, Ind. For., III., 238.*
T. pentandra.—Leaves and shoots. *Lisboa, U. P. B., p. 200.*
Tribulus alatus, *Delile.*—Seeds.
T. terristris.—Herb and seeds. *Dec. Fam.* "The small spiny fruits of this plant are said to have constituted the chief food of the people during the Madras Famine. *Econ. Prod. of India, Part VI.* See also *Lisboa, U. P. B., p. 196.*
Trichosanthes cucumerina.—Fruit. *Shortt, Ind. For., III., 238.*
Triticum sativum.—(The chaff in famine.) *Lisboa, U. P. B., p. 208.*
Typha elephantina.—Pollen *Dec. Fam.*
T. latifolia.—Seeds. *Dec. Fam.*
Typhonium bulbiferum.— } Bulb and leaves. *Lisboa, U. P. B., p. 207.*
T. divaricatum.— }
Urginea indica.—Leaves. *Dec. Fam.*
Vangueria edulis.—Green fruit. *Dec. Fam.*
Vitis quadrangularis.—Leaves. *Dec. Fam. Shortt, Ind. For, III., 236.*
Zea Mays.—Grain. *Lisboa, U. P. B., p. 208.* (The cobs in famine.)
Zizyphus nummularia, *W. & A.*—Fruit.
Z. Jujuba.—Dry fruit powdered. *Dec. Fam.*
Z. rugosa.—Fruit. *Dec. Fam.*

Fan Palms, see Borassus flabelliformis, *Linn.; Vol. I., 495.*

FARSETIA, *Desv.; Gen. Pl., I., 72.*

A genus of under-shrubs or herbs, comprising about 20 species; natives of South Europe, West Asia, and North Africa. There are three Indian species which have much the same habitat, possess the same economic properties, and are known to the natives by the same vernacular names; they may therefore be considered collectively.

33 **Farsetia ægyptica,** *Turr.; Fl. Br. Ind., I., 140;* CRUCIFERÆ.

34 **F. Hamiltonii,** *Royle; Fl. Br. Ind., I., 140.*

35 **F. Jacquemontii,** *H. f. & T.; Fl. Br. Ind., I., 140.*

Vern.—*Mulei, fárid búti, láthia, fárid múli,* PB.

References.—*Stewart, Pb. Pl., 13; Murray, Pl. and Drugs, Sind, 49; Baden Powell, Pb. Pr., 328; Spons, Encyclop., 1079; Gazetteer, N. W. P., IV., lxxvi. i.; Punjab, Montgomery Dist., 20; Settlement Report of the Montgomery Dist., 20.*

Habitat.—F. ægyptica is found in the Salt Range of the Panjáb; F. Hamiltonii in the Upper Gangetic plain and the Panjáb, also from

Agra westwards; and F. Jacquemontii, in sandy places in the Panjáb and Sind

MEDICINE. 36

FOOD Seeds. 37

large bustard

FEATHERS AND BIRDS USED FOR ORNAMENTAL PURPOSES.

38

Dr. Forbes Watson, in his list of Indian Products, drawn up in connection with a proposed Industrial Survey of India, enumerates some 68 birds, the plumage of which are used for ornamental purposes It is, per-

special feathers obtained from them, or on account of their entire skins. The

Jay.

The fea-

39 40 41 42 43 44

7th—Pavo cristatus. The Peafowl

8th—Plotus melanogaster. The Snake-bird.

9th—Upupa nigripennis The Hoopoe

45 46 47

In works treating of feathers, the subject is generally referred to Common Feathers used in Upholstery; Down; Ornamental Feathers; and Quills

that of Ostrich Farming. In another volume (under Ostrich) will be found some account of this industry, but it is believed the Trade Returns of Feathers, at the present date, refer mainly if not entirely to the second class of ornamental feathers. Prior to the year 1879-80 the exports from India of ornamental feathers were valued at about 1½ lakhs of rupees. Since that year, however, they seem to have steadily increased. In 1880-81 they were valued at R2,69,447; in 1882-83 at R3,04,253; in 1884-85 at R6,33,017; and last year (1887-88) at R5,70,405. The imports are unimportant, the highest record having been in 1886-87, when the imports of

total number of birds

trade. A missionary

once mentioned to the writer that were he to adopt the system pursued by traders in capturing and destroying the blue roller, he could from the proceeds easily render his charge self-supporting. Dr. Balfour gives in his *Cyclopædia of India* an interesting account of the industry in ornamental feathers. A passage from that work may be here given: "Commercolly, in Bengal, is celebrated for its egret's feathers for head-dresses, tippets, boas, and muffs, and some of them are exceedingly beautiful, and not inferior in quality to those imported into Great Britain from Africa. The down of the young adjutant bird is also made into ladies' boas and victorines. The under-tail coverts are collected and sold in considerable quantity. Many are procured at Trichoor in Malabar. In the Panjáb the narrow black wing feathers of the onkar are used to make the *kalgi* or plumes for the *khod* or helmet. These plumes have a very elegant appearance; they stand about 6 or 8 inches above the helmet. The feathers of the bustard are similarly used. In Madras, dealers in birds' feathers carry on their trade on an extensive scale. One dealer had nearly 100 sets of hunters, each composed of four or five shikaris and one cook; most of these people are Korawa (basket-makers) who live in and about Madras. Each set has its headman, who is responsible for the others. These sets are sent out once a year, each receiving from R20 to R100, together with a certain number of nets, a knife, &c. They traverse all India, collecting the feathers of king-fishers, and return after six or eight months to Madras, each set bringing from 1,000 to 6,000 feathers, which are taken by the dealers at R14 per 100, and shipped to Burma, Penang, Singapore, and Malacca, bringing 10 to 13 dollars the 100." "The blue feathers of the jay, the king-fisher, and other blue-feathered birds are largely used in China for ornamentation, pasted on silver gilt."

Feather Grass, see Stipa.

FEL—Bile.

48

Vern.—*Safra*, Hind.; *Pitta*, Sans.; *Safral*, Arab.; *Zahrahe*, Pers.

MEDICINE. Bile. 49

Medicine.—The bile of the buffalo, wild boar, goat, peacock, and the rohituka fish are used in medicine, as laxatives, and also in place of water in which to soak powders intended to be made into pills (*U. C. Dutt*).

Gall. 50

Gall is an absorbent and purgative; it is used along with antimony as a stimulant for the eye. In 1 drachm doses, mixed with 1 drachm of wax, when taken internally, it is said to cause abortion. Bile made into an ointment is used in inflammatory swellings (*Dr. Emerson*).

Special Opinions.—§ "Bile of fish or of the goat is given in night-blindness" (*J. N. Dey, Jeypore*). "Black pepper soaked in the bile of pigs for 40 days is given to cure madness" (*V. Ummegudien Mettapollian, Madras*). "Pigment calculi from the gall bladder of the cow, *gorochana*, are much valued by the natives as a medicine, and fetch a very high price" (*W. Dymock, Bombay*).

Felis, see Tiger.

FELSPAR.

51

Felspar.—The felspar group of minerals is the most important of all the rock-forming materials. Granitic rocks may be said to consist of quartz, mica, and felspar. The disintegration of granite frequently results in the quartz and mica being washed away, with the decomposed materials of felspar left in a more or less state of purity. This constitutes the finest of all known pottery clays. Impure clay may be said to be pure clay adulterated with organic and metallic substances.

Several works refer to felspar as an economic mineral, such as the Manual of the Coimbatore District, pages 23 and 453, the Manual of Trichinopoly District, page 67; and *Mason's Burma and its People*, pages 583, 734, &c. Since, however, felspar is employed almost entirely in the art of pottery, the reader is referred for further particulars to the article Clay in this work (*Vol II, pp. 360 to 368*)

Fennel, see Fœniculum vulgare, *Gærtn*; UMBELLIFERÆ.

Fennel, Flower, see Nigella sativa, *Linn.*, RANUNCULACEÆ.

Fennel, Giant, see Ferula below.

Fenugreek, see Trigonella Fœnum-grœcum, *Linn*, LEGUMINOSÆ.

FERNS.

52

Ferns.—Beddome, in his *Ferns of British India*, describes over 700 species and varieties This may be accepted as an enumeration of only the better-known Indian forms Out of that large assemblage of highly ornamental plants, however, only some 10 or 12 are of interest economically

[illegible] the hill tribes of India He has point- [illegible] o the hill tribes of Manipur and the [illegible]

[illegible] *ay*, is by Stewart referred [illegible] He wrote: "I have no clue [illegible] generally derived from, or whence it is brought, but Kábul is given by one authority, and Honigberger says 'the hills' It is used as an alterative." Polypodium [illegible]

disorders and are frequently combined with Cassia pulp and honey. He identifies the *basfáij* with the Polupodion (περὶ πολυποδίου) of the Greeks, and the *Azrás-el-kalb* of the Arabs. Among the other medicinal ferns may be mentioned **Actiniopteris dichotoma** (*Vol. I., No. 448 A.*), which is used as an anthelmintic and styptic. **Dymock** mentions a species of **Asplenium** (known at Goa as *Kálí pándan*) which is employed as an alterative in cases of prolonged malarious fever. **Asplenium fimbriatum** is said to be given by the natives of British Garhwal as a remedy for snake-bite.

FERONIA, *Correa; Gen. Pl., I., 305.*

53

Feronia elephantum, *Correa; Fl. Br. Ind., I., 516;* RUTACEÆ.

THE ELEPHANT- OR WOOD-APPLE, *Eng.;* BALONG, *Port.;* POMMIER D' L'ELEPHANT, *Fr.*

Syn.—CRATÆVA VALLANGA, *Kœnig.*

Vern.—*Kaith, bilin, kait* (*kowit*), *kat-bél, kavitha,* HIND.; *Kath-bel, kait, kát-bél,* BENG.; *Kainta, koch-bel,* SANTAL; *Koeta,* URIYA; *Kyth* (SHAJEHANPUR), N. W. P.; *Kait, bilin,* PB.; *Keiri* (AJMIR-MERWARA), RAJ.; *Katori, kavatha,* SIND; *Kabit,* BERAR; *Kavit, kowit,* BOMB.; *Kawat, kavith, kavatha, kovit,* MAR.; *Kotha, kavit,* GUZ.; *Vellam,* MADURA; *Vilám, vallanga, velá, kavít, kairt,* TAM.; *Thana, kavít,* KONKAN; *Velagá,* or *néla velaga, elaka, yellanga, kapidh,* TEL.; *Bilwar, byala da hannu, byala, bélada, bél,* KAN.; *Vilám,* MALAY.; *Hman, mahan,* BURM.; *Divul* or *diwul* (*meladi-kurundu,* TAM. in CEYLON), SING.; *Kapittha, kapipriya* (dear to monkeys), *bilin* (*dadhiphala*—the fruit), SANS.; *Kabít,* ARAB.; *Kabit,* PERS.

References.—*Roxb., Fl. Ind., Ed. C.BC., 374; Brandis, For. Fl., 56, Kurz, For. Fl. Burm., I., 198; Gamble, Man. Timb., 62; Dalz. & Gibs, Bomb. Fl., 30; Stewart, Pb. Pl., 29; Sir W. Elliot, Fl. Andh., 83, 133, 145, 159, 190; Rev. A. Campbell's Report on Econ. Prod. Chutia Nagpur, No. 8211; Mason, Burma and Its People, 452; Stocks, Report on Sind; Sir W. Jones, V., 119, No. 42; Pharm. Ind., 48; Ainslie, Mat. Ind., I., 161; II., 82; O'Shaughnessy, Beng. Dispens., 14; Moodeen Sheriff, Supp. Pharm. Ind., 140; Pereira, Mat. Med. II., p. 550; U. C. Dutt, Mat. Med. Hind., 131, 303; Dymock, Mat. Med. W. Ind., 2nd Ed., 142; Pharmacographia Indica, 281; Flück. & Hanb., Pharmacog., 131, 239; S. Arjun, Bomb. Drugs, 22; Murray, Pl and Drugs, Sind, 79; Moodeen Sheriff's new work on Materia Medica, South India (Proof Copy), pp. 79—81; Baden Powell, Pb. Pr., 334; Atkinson, Him. Dist., 736; Econ. Prod., V., 44, 52; Drury, U. Pl., 212; Lisboa, U. Pl. Bomb., 34, 148, 250, 291; Birdwood, Bomb. Pr., 13, 142, 259, 324; Cooke, Gums and Gum-resins, 17; Atkinson, Gums and Gum-resins, 5, 7, 16; Liotard, Dyes, 33; Watson, Report on Gums, 4, 18, 20, 34, 65, 68; Spons' Encyclop., 793, 1414, 1621, 1668, 1692-3; Balfour, Cyclop., 1086; Smith, Dic., 163; Treasury of Bot., 490; Kew Off. Guide to the Mus. of Ec. Bot., 25; Kew Off. Guide to Bot. Gardens and Arboretum, 68; Journ., As. Soc., II., ii., 1867, 79; Home Dept. Cor. in connection with the Pharm. of India, 238; Indian Forester, III., 200; V., 13; XI., 388; XIII., 119; Gazetteers of Bengal (Orissa), II., 180; Of N.-W. P., I., 79; IV., p. LXIX; X., 307; Of Mysore and Coorg, I., 49; Of Bombay, V., 24, 285, 360; VI., 13; VII., 39, 40, 42; XIII., 25; XV., 69; XVII, 25; XVIII, 47; Of Burma, I., 133; Of C. P., 136; Settlement Reports of C. P., Mandla, 89; Chanda, VI.; Chindwara, 110; Upper Godavery, 38; Madras Manuals, Cuddapah Dist., 263; Trichinopoly Dist., 78; Coimbatore Dist., 41; Special Reports furnished for this work by the Conservator of Forests, Southern Circle, Bombay; Northern Circle, Bombay; Berar; Coorg; N. W. P.; Ajmir; and Northern Circle, Madras.*

Habitat.—A medium-sized tree, found in the sub-Himálayan forests, from the Rávi eastward; throughout the greater part of the plains of India, being more plentiful in the moister tracts of Bombay, Madras, Bengal, and Burma than in Northern India. To a considerable extent cultivated as a road-side tree near villages. **Stewart** says he has not seen it wild

inces, fine and

fs of best

idish,

GUM. 54

oblong or tapering tears, or in broken pieces, varying in size from a pea to that of a soap-nut; generally colourless and transparent, sometimes opaque, with numerous minute cracks on the surface; odourless, bland, and mucilaginous in taste. This gum," he continues, "is very frequently confounded with the Indian Gum Arabic, for it not only bears a great resemblance to it, but there is also a great similarity between the pronunciation of the Tamil names of both, the former being called '*Vilám pishin*' and the latter '*Vélam-pishin*' (Gum-*pishin*). Feronia gum being rather scarce and comparatively very dear, the native druggists take advantage of the above facts, and generally pick out the whiter and more transparent pieces from the Indian gum arabic and sell these for the former. The only ready and practical difference between these gums is that the gum of F. elephantum is invariably much whiter and more

brownish, dissolved in water it forms an almost tasteless mucilage, much more viscid than that of gum arabic made in the same proportions."

The chemistry of the gum does not appear to have been worked out

110° C. It left 3·55 per cent of ash."

Dye.—At the beginning of the century Dr. Ainslie wrote of the gum "that a celebrated painter mentioned" to Roxburgh "that it answers better for mixing with colours than gum arabic."

DYE. Gum 55

FERONIA elephantum.

The Wood-Apple.

DYE.

Dr. Warden, in a note to the writer on this gum, repeats the above statement, and *Spons' Encyclopædia (page 1603)* puts the matter even stronger. "For preparing water colours, it has a reputation beyond all other gums. *It is much cheaper than gum arabic, while apparently equal* to it for all purposes." This statement of the price of the gum would at least appear to be incorrect, and the reputation of the gum as used with paints would seem to rest alone on Dr. Ainslie's original statement.

Balfour gives two sentences which probably allude to one and the same substance. These are: "When an incision is made in the trunk, a transparent oily fluid exudes, which is used by painters for mixing their colours." "It yields a large quantity of a clear white gum, much resembling gum arabic in its sensible properties." So, again, Cooke, in his Report on Gums, &c., of India, while referring to this reputed property, writes that "Dr. Ainslie says that the wood-apple gum is used by dyers and painters, particularly the miniature and chintz painters; it is also employed in making ink and certain varnishes, and by the brick-layers in preparing a fine kind of whitewash." No modern writer has, however, confirmed the frequently-repeated statement of its use to painters. (Dr. McCann, for example, in his *Dyes and Tans of Bengal;* Mr. Liotard, in his *Memorandum on Dyes and Dyeing;* and Mr. Wardle, in his recent *Report on the Dyes of India*, make no mention of Feronia gum. So also Sir E. C. Buck in his work on the *Dyes of the North-Western Provinces*), while dealing fully with the art of calico-printing and distinguishing the properties of the gums used, does not allude to Feronia gum.

OIL. 56

Essential Oil 57

Oil.—One or two writers mention an OIL, but in such general terms that very little can be compiled of a definite nature on this subject. In the Settlement Report of the Chanda District, for example, it is stated that "oil extracted from the fruit is a remedy against itch." Cooke, in his *Oils and Oil-seeds of India*, says that the seeds are reputed to afford an oil. The authors of the *Pharmacographia Indica* write: "the leaves yield to distillation a small quantity of ESSENTIAL OIL similar to that obtained from *bael* leaves."

MEDICINE. Ripe Fruit. 58

Medicine.—The RIPE FRUIT, made into a sort of *chitni*, with oil, spices, and salt, is esteemed by the natives. The fruit itself is an aromatic anti-scorbutic, and in the form of a sherbet is sometimes given to children, alone or in combination with *bél* fruit, as a stomachic stimulant. It is supposed to increase the appetite and to possess alexipharmic properties.

Pulp. 59

The PULP is reputed to be especially useful in cases of affections of the gums and throat. It is also often applied externally as a remedy in snake-bite or employed to remove the pain caused by venomous insects. But for

Rind. 60

Unripe Fruit 61

this purpose the powdered RIND may be employed if the pulp be not procurable. The Hindus regard the UNRIPE FRUIT as a useful astringent in diarrhœa and dysentery, and Muhammadan authors, for example the writer of the *Makhzan-el-Adwiya*, affirm that the fruit is cold and dry in the second degree, refreshing, astringent, cardiacal, and tonic, a useful remedy in salivation and sore throat, strengthening the gums and acting as an astringent. Elephant-apple is often used to adulterate *bél* fruit, but the two fruits should be easily enough distinguished.

Leaves. 62

The LEAVES are aromatic and carminative, and have the odour of anise (*Ainslie*). The author of the *Makhzan-el-Adwiya* describes them as very astringent and as possessing the taste and odour of Tarragon. Ainslie remarks that the native practitioners of South India (in his day) prescribed the leaves "in the indigestions and slight bowel affections of children."

Bark. 63

The BARK is said to be sometimes prescribed for biliousness.

Gum 64

The GUM has already been alluded to. Ainslie was the first writer to affirm that in medicinal properties the gum of this tree came nearest of

MEDICINE.

all Indian gums to the true gum arabic. "The Tamool practitioners prescribe a solution of gum arabic," he says, "to relieve tenesmus in bowel affections, and as we do in other cases requiring demulcents," and he states that for this purpose Feronia gum "is commonly used for medicinal purposes by all the practitioners of Lower India."

OIL 65

A fatty OIL has be [illegible] source and nature have [illegible] according to some write [illegible]

[illegible]

FOOD. Fruit. 66

[illegible]

Surgeon-Major Robb informs the writer that the fruit is used as a condiment. Under the paragraph "Medicine" above it has been stated that a *chátní* is also made of it. In the *Medical Topography of Dacca* it is said that the name Elephant-apple proceeds from the fact that the elephant is very fond of the fruit. "It is," Dr. Taylor adds, "prepared by the natives as an article of diet, by mixing the pulp with salt, oil, and pepper." Dr. Buchanan-Hamilton, in his account of Dinajpur, says, the fruit is eaten by the natives "but is very poor." On the other hand, many writers speak of the fruit in much higher terms. The Conservator of Forests, Northern Division, Madras, in a recent communication, says:—"This tree is common and of good size in the Northern Circars. It is [illegible]

TIMBER. 67

[illegible] reported that "the wood, [illegible] various purposes." In the [illegible] "the wood is white, hard, [illegible] *e and Coorg Gazetteer* it is [illegible] is "suited for ornamental carving."

DOMESTIC. Fruit. 68

Domestic Uses.—The hard dry shells of small FRUITS are used as snuff-boxes.

FERULA.

The Source of Asafœtida.

Ferrum, see Iron.

69

FERULA, *Linn.; Gen. Pl., I., 917.*

A genus of umbelliferous herbs, comprising some sixty species, a few of which, though growing on perennial root-stocks, attain annually a height of from 8 to 10 feet. Interest in the species of FERULA is mainly centred on the sub-arborescent forms—the Giant Fennels,—which may be said to be characteristic of the dry semi-desert tracts of Central Asia. From these are obtained the various forms of *Asafœtida, Galbanum, Sambul*, &c. So much confusion even still exists, however, in the literature of these famed drugs, that the writer has thought it the preferable course to give a concise review of the history of Asafœtida and rest satisfied with brief notices under the individual species of FERULA. But even in so far he will touch only on the species that can be regarded as connected with the Trade and Commerce of India.

HISTORY. 70

History of Asafœtida.—When **Dr. Falconer**, in 1838, discovered **Narthex Asafœtida** in the valley of Astor, North Kashmír, it was at first supposed that the problem of the source of the drug asafœtida had been solved. The roots procured by him were planted in the Saharanpur Botanic Garden. Seeds were subsequently sent to the Royal Botanic Gardens at Edinburgh. In 1842 these germinated, and in 1859 several of the plants flowered, yielding seeds which were distributed to the various botanical gardens throughout the world. From this source the so-called asafœtida plant in cultivation was derived. It must be observed, however, that while this species yields an asafœtida-like substance, it has by no means been demonstrated that any portion of the asafœtida of European commerce is derived from it. **Sir J. D. Hooker** figured the plant in the *Botanical Magazine*, No. 5168. He *then* wrote that it "yields excellent asafœtida in the form of copious milky juice." But he added, "It would be impossible to discuss here the vexed question of the history of the origin of all the asafœtidas, nor would the discussion be very profitable." Long anterior to **Dr. Falconer's** discovery, the German traveller **Kœmpfer**, in the year 1687, saw asafœtida being extracted from a species of **Ferula** in Lauristan in Persia. He brought to Europe samples of the resin and a fragmentary specimen of the plant from which that resin had been obtained. These specimens were described by **Linnæus** under the name of **Ferula Asafœtida**. But **Kœmpfer's** collections are in the Sloane Herbarium at the British Museum, and were carefully examined by **Dr. Falconer**, with the result that he entertained a strong suspicion that **Ferula Asafœtida**, *Linn.*, was not the plant he had discovered in Northern Kashmír. He accordingly named his plant **Narthex Asafœtida**. **Hooker** (*Bot. Mag., l. c.*) wrote that "it is certain that **Kœmpfer** had two plants (species or varieties) in view, from different countries, that his descriptions and drawings and specimens (in the British Museum) do not tally, and that though **Dr. Falconer** considers his plant one of **Kœmpfer's**, other botanists do not." The discovery, in the Steppes east of the Caspian, of the plant **Bunge** named **Scorodosma fœtidum** is also referred to by **Hooker**. **Borszczow**, who devoted some attention to the genus **Ferula**, also examined **Kœmpfer's** specimens, and came to the conclusion that they should rather be referred to **Scorodosma**. **Royle**, on the other hand, held the opinion that **Kœmpfer's** plant should be assigned to the genus **Narthex**. More recently **Boissier** referred an asafœtida-yielding species, discovered by him in Persia, to **Ferula Asafœtida**, *Linn.*, and *that* modern writers regard as **Scorodosma fœtidum**, *Bunge*, a synonym for **Ferula fœtida**, *Regel*, but view it as most probably not **Ferula Asafœtida**, *Linn.* **Dr. Dymock**, however, writes to the author that he is disposed to think that **Ferula Asafœtida**, *Linn.*, may prove the same as **Ferula fœtida**, *Regel*.

The learned authors of the *Pharmacographia* are careful to say that it has not been proved that either of the plants reputed to yield the

HISTORY.

Asafœtida of European commerce is actually the source of that drug. The species they allude to are Ferula Narthex, *Boiss.* (the Narthex Asafœtida, *Falconer*), and Ferula Scorodosma, *Bentl. & Trim* (the Scorodosma fœtidum, *Bunge*, and Ferula Asafœtida, *Linn.*, in *Boiss. Fl Or*). Dr.

...riters who pointedly ...hly prized in India ... This was noticed ... *des Drogues, III*, ...iausseux—*Gommes*... ...ock restricted the ...bject, were viewed ...ily-prized drug the name of *Hing*, and that of *Hingra* to the European Asafœtida. In a letter to the writer he says, however, that "the name *Hing* may be applied to any choice asafœtida. *Hingra* means common asafœtida, just as *Rai* in Guzerathi means Mustard and *Raira* Rape. With the public generally all kinds of asafœtida are *Hing*." Fluckiger &

the result, perhaps, of more careful preparation, or due to being derived

juice collected in the manner described by Kœmpfer, who witnessed its collection in the province of Láristan in Persia." Dr. Dymock obtained this information, together with a specimen of the plant, from Dr. Peters, but in a correspondence on this subject, he authorises the writer to say that he is now convinced Dr. Peters' plant is Ferula fœtida, *Regel*.

Turning to the more recent botanical publications regarding Afghánistan—Dr. Aitchison's various official reports—it is somewhat surprising that that author makes no mention of having seen Ferula Narthex. He deals, however, with Ferula fœtida, *Regel*, and under that species he places the following synonyms:—F. Scorodosma, *Bent. & Trim.*, Scorodosma fœtidum, *Bunge*, and Ferula Asafœtida, *Boiss.* He affirms that the

num, &c., &c. The opinion seemed to have been formed that the whole difficulty regarding Asafœtida had been removed.

FERULA.

Two forms of Asafœtida.

HISTORY.

In the correspondence with Dr. Dymock (to which reference has been made above), there occurs the following passages, which may fitly be quoted in concluding this brief review: "I think," he writes, "we may regard it as settled that the asafœtida of commerce in Europe is all derived from F. fœtida, *Regel*, growing in Persia and Afghánistan." Dymock retains two species, however, as yielding—the one the Indian, the other the European—asafœtida and (following Holmes) gives the synonymy of these species as follows:—

"1. Ferula alliacea, *Boiss.*

Syn.—F. ASSAFŒTIDA, *Boiss. et Bunge, non Linn.*

"This produces the *Hing* of Bombay markets—the kind of asafœtida preferred as a condiment in India.

"2. F. fœtida, *Regel.*

Syn.—F. SCORODOSMA, *Bentl. & Trim.* (wrongly lettered in their plate No. 127 as FERULA FŒTIDA, *Benth. & Hook. f.*), also SCORODOSMA FŒTIDUM, *Bunge*, and F. ASAFŒTIDA, *Boiss.* (? *Linn.*)

"The selected gum from the bud is called Kandaharí *Hing*, and fetches a high price. The thick opaque gum afterwards obtained from the root is the asafœtida of European commerce."

Presumably, therefore, the opaque gum is the *Hingra*, but according to the above notes, the same species furnishes a superior form of *Hing* also. It may accordingly be suggested that perhaps after all certain species of Ferula yield either *Hing* or *Hingra*, or both these drugs—the superior and inferior qualities of Asafœtida. Future research may reveal the fact that, as with Cannabis sativa in affording various resinous substances, so with certain species of Ferula, different systems of extraction and manipulation, or diversified conditions of climate and soil, produce both *Hing* and *Hingra*. It is difficult to believe that only two species contribute to the supply of these products, while perhaps half a dozen are alluded to by travellers as affording a milky sap which, on drying, possesses at least the physical properties of Asafœtida. It may, however, be safe to affirm that the bulk of the Persian drug imported into India by sea is the *Hing*, derived from Ferula alliacea, but that a considerable proportion of the *Hingra* comes also from Persia and Turkistan. The whole of the asafœtida that enters India by the frontier land routes from Afghánistan is now satisfactorily proved to be derived from F. fœtida. This conclusion would seem to be borne out by the trade returns of India, where a far larger quantity of *Hingra* (European Asafœtida) is shown to be exported to Europe and other countries than would appear to be imported from Afghánistan by road, rail, and river.

TRADE.
71

TRADE IN ASAFŒTIDA.

In the statement of the Trade and Navigation of British India, Asafœtida was apparently first separately returned (apart from other minor drugs) in the year 1876-77. Since, however, almost the entire traffic takes place with Bombay, the Asafœtida statistics of that Presidency, for earlier years, may be accepted as representing the whole of India. In the report for 1868-69 two forms of asafœtida are separately recorded in the Presidency Statistics; these were:—

(*a*) *Hing*—

Imports from the Persian Gulf . . .	1,538	cwt., valued at	R	85,118
" " Madras	7	"	"	412
" " Sind (Karáchi) . . .	695	"	"	18,455
These give a total of *Hing* imported into Bombay of	2,240	"	"	1,03,985

TRADE.

(*b*) *Hingra*—

Imports from the Persian Gulf	1,893 cwt.,	valued at	R	18,935
" " Sonmeanee and Meckran	20	"	"	114
These give a total of *Hingra* imported of	1,913	"	"	19 049

The *Pharmacographia* quotes the similar returns for 1872-73, *viz.*, 3,367 cwt. of *Hing* and 4,780 cwt of *Hingra*, but the authors of that work would appear to have regarded the former as the asafœtida of European commerce and the latter a crude article, since they write "the value of the latter is scarcely a fifth that of the genuine kind." Later on they deal with *Hing*, remarking that "among the natives of Bombay, a peculiar form of asafœtida is in use that commands a much higher price than those just described." This mistake is here pointedly

As stated above,

Hingra, but the

In 1876-77 the

collectively) were

the present date

the Kábul market. The following may be given as the IMPORTS of Asafœtida into India *by land* during the past five years —

IMPORTS. By land. 72

1884-85	1,218 cwt,	valued at	R1,04,023
1885-86	1,775	" "	95,652
1886-87	1,090	" "	53 310
1887-88	1,030	" "	47,192
1888-89	907	" "	37,615

Of these land imports the major portion comes from Kábul, and is presumably therefore derived from F. fœtida,—the *Hingra*.

The IMPORTS *by sea* during the corresponding periods were :—

By sea. 73

1884-85	10,340 cwt.,	valued at	R3,50,076
1885-86	7,228	" "	2,69,883
1886-87	5,704	" "	2,53,303
1887-88	4,521	" "	1,70,973
1888-89	9,504	" "	4,31,502

The figures for the last of these years relate to Bombay : as a rule Sind is the only other province that receives asafœtida by sea (except small quantities imported by Bengal and Madras from Ceylon or Aden), and the imports into Sind were last year 50 cwt , valued at R797. During the same periods the foreign EXPORTS (drawn from the above imports) were :—

EXPORTS. 74

1884-85	2,638 cwt.	valued at	R57,471
1885-86	2,530	" "	49,0[illegible]6
1886-87	1,[illegible]65	" "	41,543
1887-88	1,553	" "	27,451

The figures for the year 1888-89 have not as yet been published. It will thus be seen that, deducting these exports from the total imports (in

Trade in Asafœtida.

TRADE.

round figures), about two-thirds of the imported drug remain in India, so that India is itself perhaps the largest asafœtida-consuming country in the world. The highest exports on record were in 1883-84, *viz.*, 4,065 cwt., valued at R86,457, and the following year showed the highest imports, *viz.*, 10,340 cwt., valued at R3,50,076.

In the statement of the Trade and Navigation of British India, however, a trade is shown in exporting asafœtida, which is returned as "Indian produce and manufacture." The writer is utterly at a loss to understand what this can mean. He is not aware that any asafœtida is produced in India, and therefore (as with camphor) it seems probable that the drug undergoes some process of "manufacture," more probably a systematic adulteration than a purification. There are two features of this so-called Indian asafœtida that may be here mentioned. It goes entirely to the United States of America, Australia, and Mauritius; none of it to Europe or China. It is exported from Calcutta or Madras; none of it from Bombay—the port that supplies Europe and China. The trade in the so-called Indian asafœtida fluctuates very considerably, but it seems to have been steadily declining for some years back. In 1879-80, however, it amounted to 1,130 cwt., valued at R23,698, and of this the United States took 943 cwt. In 1884-85 it amounted to 1,343 cwt., but the average of the past ten years does not much exceed 300 cwt., and in 1887-88 the trade had decreased to 4 cwt., 3 of which went to Australia.

PRICES, &c.
75

Prices, Description, &c.—The declared value of products in trade statistics are not often of much practical importance, since dealers may be presumed to give a valuation of their articles which best suits their own interests. Viewing the figures given above, remarkable fluctuations in the declared values will be observed which are, to some extent, doubtless due to the reason given above. The article varies much, however, according to supply and purity. Dr. Dymock says of *Hingra* "the imports into Bombay are about 2,500 cwts. annually from Persia and Afghanistan. Value R10 to R20 per Surat maund of 37½lbs." There would seem to be some mistake as to this estimate of the extent of the Bombay imports of *Hingra*. Last year (1888-89) the imports by sea were 5,042 cwt. and from Kábul 907 cwt. An average of 5,000 cwt. would thus appear a safer estimate. Dr. Dymock next deals with Khandahari *Hing*, which he concludes is derived from the same plant as *Hingra*. He says it comes into "the Bombay market in small quantities; it is sewn up in goat-skins, forming small oblong bales, with the hair outside. When it first arrives it is in moist flaky pieces and tears, from which a quantity of reddish-yellow oil separates on pressure; the gum-resin is also of a dull reddish-yellow colour, soft and somewhat elastic; with an odour recalling that of garlic and oil of caraways. By keeping, it gradually hardens and becomes brittle and of a rich red-brown colour; the odour also becomes more purely alliaceous, and approaches to that of the commercial kind." "This kind of *Hing* is entirely consumed in Bombay by the manufacturers of adulterated asafœtida, its strong odour and flavour making it especially valuable for this purpose. The average value is R25 per Surat maund of 37½lb." The ordinary form of *Hingra* (good quality) "occurs in tears or flat pieces, upon the under-surface of which particles of sand often adhere; the external surface is yellowish, but the fresh fracture is of a pearly white, which, by exposure to the air, becomes bright pink and finally dirty yellow. Inferior samples consist of agglutinated tears, with a certain proportion of moist brown clammy gum-resin filling up the interspaces between them. Sometimes the asafœtida which comes from Persia is a homogeneous, soft, white, mass like clotted cream; these parcels upon exposure to the air develop

Asafœtida—Hing (G Watt) FERULA alliacea.

TRADE.

…powerful but not purely … rable description It … Abu shaheri-Hing, it arrives in skins which contain about 100lb, latterly some boxes have been received The quality varies greatly, inferior parcels contain an undue proportion of the root, in Bombay it is often still further adulterated by mixing it with gum arabic … to the priced article required … moistened, the gum is then added … men with naked feet upon a mat … in skins to imitate the original … sliced potato has been observed *Hing* of good quality is worth about R80 per cwt in Bombay" In an earlier passage Dr Dymock gives additional facts regarding this form of asafœtida He writes "The col… of alternate layers of root and gum resin when … 100lb) forms the *Hing* of Indian … in large quantities (about 2 500 … Custom House for assessment at … *Hingra*, being only valued at … the imports of *Hing* for many years past have never been below 3 500 cwt, and last year they were 4 462 cwt In a report on the Land Trade of Sind, it is stated that Afghánistan asafœtida is valued at R50 per maund, "while that imported from Beluchistan is only R14 per maund, the latter having been of a very inferior or coarse description" Dr Aitchison came across a root of asafœtida in Northern Beluchistan after much difficult searching which he believed to belong to another species, *i.e.*, not F fœtida. He found many leaves in traversing the plains, where he …

to Bombay (quoted in the opening paragraph above), *viz*, that *Hing* and not *Hingra*, as might have been expected, appears in the early official returns.

(J Murray)

Ferula alliacea, *Boiss* 76

References.—…

FERULA alliacea.

Asafœtida—Hing.

Persia in the neighbourhood of Djendack and Yezd, and in Khorassan near Scharud, Nischapur, Meshed, Dehrachtindjan, and Kerman (Buhse). Called *Angusheh* in Khorassan and *Zendebuj* in Kirman (*Boiss. Fl. Or.*, 995). It grows on stony arid soil, and to an altitude of 7,000 feet.

CULTIVATION. 77

Cultivation.—Grows wild; is not cultivated.

GUM-RESIN. Collection. 78

GUM-RESIN.

COLLECTION.—The following description is given by **Dr. Dymock** (*vide Mat. Med. of Western India, p. 382*), on the authority of a merchant of Yezd, who had personally seen the process going on:—

"The hill-men collect the gum-resin, taking an advance from the merchants. The time for collecting it is in the spring." "The collectors protect each plant by building a small cairn of stones round it; they also remove the soil from the upper portion of the root, making a kind of circular basin. When the stem begins to grow it is cut down, and the upper part of the root being wounded, a small quantity of very choice gum is collected, which seldom finds its way into the market. Afterwards, a slice of the root, about ¼ inch thick, is removed every two or three days with the exudation adhering to it, until the root is exhausted. The collected mass, consisting of alternate layers of root and gum-resin, when packed in a skin (in quantities of about 100lb), forms the *Hing* of Indian commerce."

Characters. 79

CHARACTERS.—The gum-resin, as found in the market, consists of a blackish-brown, originally translucent, brittle mass of extremely fœtid alliaceous odour, unadulterated by earth, or gypsum, but always containing slices of the root. **Dr. Dymock** mentions that in Bombay it is often adulterated by the addition of gum arabic, and that the cheaper sorts contain an undue proportion of the root. This is produced by the exhausted root being cut up and mixed with the gum-resin and water. Recently, adulteration with sliced potato has been observed.

The term "*hira-hing*" is said to be applied to a liquid of treacly consistence, often found in the centre of the bales, which is squeezed out and sold at a high price. (*Spons' Encyclop.*)

Chemistry. 80

CHEMICAL COMPOSITION.—The essential oil is very abundant, and differs from that of *Hingra* in having a reddish hue, being of higher specific gravity, and having a much stronger rotatory power.

An alcoholic tincture is not precipitated by acetate of lead, nor is the sulphuric acid solution fluorescent. In all these respects there is consequently a well-marked difference between *Hing* and *Hingra* (*Flückiger and Hanbury*).

MEDICINE. Gum-resin. 81

Medicine.—This drug is very much used in India, and has, from the earliest times, been held in great esteem by eastern doctors. It is reputed a carminative and antispasmodic, and therefore as useful in colic, cholera, &c., and when taken daily it is said to ward off attacks of malarial fever. Hindú medical writers direct it to be fried before being used. The Muhammadans place asafœtida amongst their aphrodisiacs and hypnotics, and consider the FRUIT to be stimulant (*Dymock*). Waring, in the *Pharmacopœia of India*, writes, "it produces excellent effects in the advanced stages of pneumonia and bronchitis in children." Information collected from medical men in various parts of the country shew that the drug is considered useful as a carminative in colic and flatulent dyspepsia, as an anthelmintic in cases of round worm, and as an emetic. It is also described by two writers as a useful local anæsthetic in hemicrania and dental caries.

Fruit. 82

SPECIAL OPINIONS—§ "*Hing* is said to be used internally in guinea-worm and colic. Dose 5 to 15 grains, made into a paste with water; it is used as an external application to frontal headache" (*Joseph Parker, M.D.*,

Asafœtida—Hingra. (J. Murray)

FERULA fœtida.

MEDICINE.

Deputy Sanitary Commissioner, Poona). "It is also an aphrodisiac; and is very useful in rendering *dál* digestible—an important article of native dietary" (*Surgeon-Major A S. G Jayakar, Muskat*). "Useful in dyspepsia with indigestion" (*Surgeon J. C. H. Peacocke, I.M D, Nasik*). "Given as an emetic in poisoning by opium and other substances Also used to expel round worms. Very useful in flatulent colic" (*Assistant Surgeon Shib Chundra Bhuttacharji, Chanda, Central Provinces*). "An emulsion (grs 5 to 1 drachm) dropped into the nostril is useful in cases of hemicrania. In caries of the teeth a mixture of opium and *hing* may be put into the hollow tooth" (*Surgeon James McCloghey, Poona*) "The utility of asafœtida in the early stages of cholera appears to me to be undoubted It should be given in [illegible] pepper, opium being added if the [illegible] (*Surgeon S. H. Browne, M.D., Hosha*[illegible] native midwife uses this to encoura[illegible] birth The gum-resin is first fried, a small quantity is then mixed with [illegible]

[illegible]

K D. Ghose, M.D, M R C.S, Khoolna) [illegible]

FOOD

[illegible]

Ferula fœtida, *Regel*.

84

Syn.—Ferula Scorodosma, *Bent & Trim, Med Pl, No 127*, Scorodosma fœtidum, *Bunge*, Ferula Asafœtida, *Boiss, Fl Or II*, [illegible]

Sans [illegible]

References.—*Aitchison's Afghan Del Com Rept, p 68, Irvine, Med* [illegible]

[illegible]

Note.—Many of the references above are to passages describing Ferula Narthex or Narthex Asafœtida, which are presumed to be in reality accounts of F. fœtida, *Regel*

[illegible]

Asafœtida—Hingra.

CULTIVATION. 85

Cultivation.—It is described by **Aitchison** and others as growing freely of itself, without any cultivation, in the sandy deserts of the countries given above. **Dr. Aitchison** in his paper on "Some Plants of Afghanistan, and their Medicinal Products" writes,—"The country in which these UMBELLIFERÆ flourish consists of the great shingle and conglomerate plains lying between the hills and the beds of the rivers, which are broken up by numerous ravines and traversed by what are usually dry water-courses, which once in every two or three years, on the occurrence of heavy falls of snow on the hills above, or local showers of rain, suddenly become roaring torrents. The altitude of these plains above the sea-level ranges from 2,000 to 4,000 feet. Theseplains during winter are perfectly treeless and bare, the only signs of a past vegetation being the gnarled remains scarcely over a foot in height, of a few shrubs." "In early spring great cabbage-like heads are to be seen distributed at intervals amongst the asafœtida plants. Their peculiar forms represent the primary stages of the flower-heads, enclosed and completely covered up by the large sheathing stipules of its leaves." From these the tall flowering stalk arises and the circular mass of foliage springs out, after which the plant assumes its fully grown appearance. Only about one plant in a hundred is said by **Aitchison** to bear a flowering stem. The only localities in India offering the natural conditions required for the growth of **F. fœtida** are perhaps parts of the sandy deserts of Rajputana, Sind, and the Panjáb. The remark, therefore, in *Spons' Cyclopædia*, drawing the attention of planters in India to the simplicity of its cultivation, seems rather out of place.

GUM-RESIN. 86

Gum-resin.—Forms the drug of commerce known in Europe as asafœtida—in India as *Hingra*. The process of collection has been variously described by **Kœmpfer, Bellew,** and others. **Dr. Aitchison's** account, being the most recent, is here given at length:—

Collection. 87

"The method of collecting the drug, as far as I could learn, was as follows. A few men, employed for the purpose by some capitalist at Herat, are sent to these asafœtida-bearing plains during June. These take with them provisions consisting of flour and several donkey-loads of water-melons, the latter in lieu of water, which is not only scarce there, but usually saline. The men begin their work by laying bare the root-stock to a depth of a couple of inches of those plants only which have not as yet reached their flower-bearing stage. They then cut off a slice from the top of the root-stock, from which at once a quantity of milky juice exudes, which my informant told me was not collected then. They next proceeded to cover over the root by means of a domed structure of from 6 to 8 inches in height called a *khora*, formed of twigs and covered with clay, leaving an opening towards the north, thus protecting the exposed root from the rays of the sun. The drug collectors return in about five or six weeks' time, and it was at this stage that the process of collecting came under my personal observation. A thick gummy, not milky, reddish substance now appeared in more or less irregular lumps upon the exposed surface of the root, which looked to me exactly like the ordinary asafœtida of commerce as employed in medicine. This was scraped off with a piece of iron hoop, or removed along with a slice of the root, and at once placed in a leather bag,—the tanned skin of a kid or goat. My guide informed me that occasionally the plant was operated upon in this manner more than once in the season. The asafœtida was then conveyed to Herat, where it usually underwent the process of adulteration with a red clay *táwah*, and where it was sold to certain export traders called *Kákri-log*, who convey it to India. On August 17th, when I crossed the great asafœtida plains, where this drug is chiefly collected, except for the small domes over each root there was not a leaf or a stem or anything left to point to the fact

GUM-RESIN.

that any such plant had ever existed there, the heat and winds of July and August having removed every trace" (*The Pharmaceutical Journal and Transactions, December 11th, 1886*)

Bellew, in *his* account, says that after cutting the plant through, above the root, three or four incisions are made in the stump The operation of incision is repeated every three or four days, so long as the sap continues to exude Bellew also describes the quantity of asafœtida obtained from each root as varying from a few ounces to two pounds, according to the thickness of the roots, which vary from the size of a carrot to that of a man's leg. The resin is called by the natives near Herat *angura* A particular sort is mentioned by Bellew as being "obtained solely from the node or leaf bud in the centre of the root-head of the newly sprouting plant" This kind is never adulterated, and sells for a much higher price than the ordinary adulterated form. *This is probably the fine quality of the drug known as Khandahari-hing.*

The common form or *Hingra* is much adulterated by the *Gwah* above mentioned, by wheat or barley flour, and by powdered gypsum It is also mixed with slices of the root The asafœtida obtained from this species of plant, with the exception of the Khandahari Hing, is not used in India. It is nearly all exported to Europe, where it forms the drug of commerce.

Characters 88

[illegible] persistent alliaceous odour and a bitter acrid alliaceous taste.

Chemistry. 89

CHEMICAL COMPOSITION.—Asafœtida consists of resin, gum, and essential oil in varying proportions, but the first generally amounts to more than half. The resin is partly soluble in ether or chloroform The essen- [illegible] may be separated [illegible] of asafœtida, [illegible] nt An alcoholic [illegible] A solution in sul- [illegible]

MEDICINE. 90

Medicine.—Asafœtida is used in Europe as an antispasmodic and stimulant, but is in much greater demand on the Continent than in Great Britain In India, unlike the allied *Hing* obtained from *F. alliacea*, it is neither used as a condiment nor as a drug

FOOD Leaves. 91

Stem. 92

Food and Fodder.—According to Drs. Bellew and Aitchison the plant [illegible] knife, remove the head, cut the stem from its base, strip off the few [illegible] in his hand you [illegible] will remove the [illegible] cool, soft, crisp, [illegible] in his "Travels in Bokhara," states that the YOUNG PLANT is eaten with relish by the people, and that sheep crop it greedily

Young Plant. 93

FODDER. 94

Trade.—See the account given under the generic head ng

95

(*G. Watt.*)

Ferula galbaniflua, *Boiss et Buhse.*

The drug known from historic times as GALBANUM is now believed to be derived from one or two species of Ferula, chiefly F. galbaniflua, *Boiss et Buhse*: F. rubricaulis, *Boiss.*, according to Borszczow, is also a source of the drug.

Vern.—*Birója, ganda-biroza* (the last name is also given to the turpentine of Pinus longifolia), HIND.; *Badra-kéma, bari-jeh* (the gum, *jao-shir*), AFG.; *Barzad, kinneh*, ARAB.; *Jawashir, khassuch, gaoshir, bireez*, PERS. According to some Muhammadan writers this is the *Khalbani* of the Greeks (περι χαλβανης of Dioscorides).

References.—*Aitchison, Pharm. Jour. and Trans., 3rd Ser., XVII., p. 466 (London 1887), also Delim. Comm. Report (Trans. Linn. Soc. III. (2nd Series), p. 65); Dymock, Mat. Med. W. Ind., 2nd Ed., 390; Flück. & Hanb., Pharmacog., 320; Bent. & Trim., Med. Pl., 128; Kew. Off. Guide to the Mus. of Ec. Bot., 75.*

Habitat.—A native of Persia, from which the gum is imported into Bombay and re-exported to Egypt and Turkey. Dr. Aitchison says this is one of the most characteristic plants of certain tracts of the Badghis, specially common around Gulran. No other plants are to be seen for miles, the young leaves on the top of the perennial stems appearing like cushions of moss.

GUM-RESIN. 96

Gum-Resin.—The *Jao-shir* resin, as met with in India, is not dry agglutinated tears, but a yellow or greenish semi-fluid resin, generally mixed with the stems, flowers, and fruits of the plant. It has an odour between that of Levant Galbanum and Sagapenum It is not used in India. Dr. Aitchison remarks: "The stem, on injury from its earliest stage of growth, yields an orange-yellow gummy fluid, which very slowly consolidates, usually forming on the stem, like the grease on a guttering candle, and possessing, in common with the whole plant, when crushed, a strong odour resembling that of celery. The gum is commonly found adhering to the lower portions of the stem, and is so tenacious that when subsequently examined pieces of the plant are frequently found attached to it. No artificial means are employed to my knowledge in the collection of this drug. It is stated to be an article of export through Persia, *viz.*, the Gulf of Arabia and India."

MEDICINE Gum-resin. 97

Medicine.—The *Jawashir* or (*Gaoshír*) was not identified by the Arabs and Persians with the Galbanum of the Greeks. The *Ganda-biroza* of the Indian bazárs is the turpentine of Pinus longifolia (which see). Muhammadan writers (*e.g.*, the *Makhzan*) describe the Persian *Gaoshír* as a fœtid gum-resin, and say it is used medicinally as an attenuant, detergent, antispasmodic, and expectorant; prescribed in paralytic affections, hysteria, and chronic bronchitis (*Dymock*). Aitchison writes that "in Persia and Afghánistan it is said to be administered to parturient women, and the entire shrub is hung round the house to keep off evil spirits whilst parturition is actually taking place."

The ordinary Galbanum of European commerce is the Levant resin—for the chemistry of which see the *Pharmacographia*.

SPECIAL OPINIONS.—§ "Oil distilled from the gum is used in gonorrhœa; it is an excellent substitute for Copaiba" (*Surgeon Anund Chunder Mukerji, Noakhally*). *Ganda Biroja*, I have been told, is useful as a topical agent to promote the absorption of inflammatory products; it may be employed thus with advantage in bubo and inflammatory enlargements generally" (*Surgeon J. Ffrench Mullen, M.D., I. M. S., Saidpore*).

TRADE. 98

Trade.—According to Dymock *Jawashir* is imported into Bombay from Persia, where it is said to be collected between Shiráz and Kirmán.

Sumbul. (G. Watt.) | FERULA Sumbul.

The imports are irregular: sometimes large quantities arrive. Most of it is re-exported to Egypt and Turkey. Value R8 per maund of 37½lb.

Ferula Jaeschkiana, *Vatke, Fl. Br. Ind., II., 708.*

99
GUM-RESIN.
100

Gum-resin.—The *Flora of British India* remarks on this species "Regel and Schmalh think that this plant probably produces the Asafœtida of Commerce; this may be so, as it is an abundant species in Kashmir, and [illegible]

[illegible]

adulterant for the true drug.

[illegible]

the north of Hariab district, at 10,000 to 11,000 feet.

MEDICINE.
Gum-Resin.
101

Medicine.—Yields a GUM-RESIN which, Aitchison says, is applied to wounds and bruises by the inhabitants of Kuram Valley.

F. Narthex, *Boiss.; Fl. Br. Ind., II., 707.*

102

Syn.—Narthex Asafœtida, *Falconer; Bent. & Trim., Med. Pl., t. 125 (the description of production and properties of drug, there given, however, most probably chiefly refer to F. fœtida, Regel); Bot. Mag., t. 5168; Balfour, Trans. R. Soc. Edinb., XX., 3??, tt. 21, 22.*

Habitat.—Found by Dr. Falconer in Astor, Baltisthan, but apparently never since re-collected.

MEDICINE.
103

Medicine.—[illegible] this species has never been found in [illegible] proving the authors incor- [illegible] Aitchison witnessed the [illegible] brought samples to Europe, [illegible] F. fœtida, *Regel.* Modern [illegible]

F. (§ Euryangium) suaveolens, *Aitch. et Hemsl., Afghan Delim. Comm. Report.*

104

Reference.—*Aitchison in Pharm. Soc. Journ., 3rd Ser. XVII., 47.*

Habitat.—Khorasan, on the hills to the south of Herat.

F[illegible]

105

MEDICINE.
106

[illegible] afford the musk-scented medicinal root—Sumbul—exported from Persia by the Persian Gulf into Bombay and thence distributed over India.

The Fescue Grasses.

(*J. F. Duthie.*)

FESTUCA, *Linn.; Gen. Pl., III., 1189.*

A large genus, and widely distributed in temperate and alpine regions. Some of the species, such as Meadow Fescue and Sheep's Fescue, are reckoned amongst the most valuable of European pasture grasses. The generic name is said to be derived from the Celtic word *fest*, meaning pasture or food.

107

Festuca elatior, *Linn.*

References.—*Mueller, Select Pl., 173; Sutton, Permanent and Temporary Pastures, pp. 36 and 44; Stebler and Schrotter, The Best Forage Plants (Eng. Ed.), 35.*

Habitat.—A tufted perennial species, with stems upwards of 3 feet, met with occasionally on the North-West Himálaya. Professor Hackel, in his monograph of the Genus, divides **F. elatior** into two sub-species, *viz.*, **pratensis** the true Meadow Fescue), and **arundinacea**, which is a taller and coarser plant.

FODDER. 108

Fodder.—Meadow Fescue has a great reputation, both in Europe and America, as being one of the most valuable grasses for pasture as well as hay. It thrives best in soils rich in humus and where the climate is damp. Cattle are said to prefer it even to Fox-tail (**Alopecurus pratensis**).

109

F. gigantea, *Vill.*

Syn.—BRORNUS GIGANTEUS, *Linn.*

Habitat.—This species is found at moderate elevations on the North-West Himálaya.

Mueller (*Select Plants, page 174*) describes it as a good perennial forest grass.

110

F. ovina, *Hackel.* (This includes **F. ovina**, *Linn.*)

References.—*Treasury of Bot., I., 490; Sutton, Permanent and Temporary Pastures, 45, 47; Stebler and Schrotter, The Best Forage Plants, 88; Mueller, Select Pl., 174.*

Habitat.—This species is easily distinguished by its compact growth and close-tufted bristle-like foliage. It occurs abundantly on the Himálaya, up to 15,000 feet, and in Kashmír. It is extremely variable and has been divided by Professor Hackel into five sub-species and several varieties, of which the following are represented in India.

Sub-species **eu-ovina**, *Hack.*, var. **vulgaris**. This is Linnæus's **F. ovina**, and the true Sheep's Fescue. According to Sutton it is the smallest grass cultivated for agricultural purposes. Owing to its hard wiry foliage it is useless for hay, but being nutritious, it affords excellent pasturage for sheep. Another variety of this sub-species is **durinscula** (**F. durinscula**, *Koch*) or Hard Fescue, so called on account of the hard nature of the florets when ripe. It has stouter stems, larger spikelets, and thicker leaves than those of the preceding variety and is altogether a more robust plant. It is also a most valuable constituent of sheep pastures in localities where the soil is too poor for the growth of better grasses,

Sub-species **subcata**, var. **Valeriaca**, (*Hack.*), is distinguished from the above varieties by having glaucous leaves and stems, and the leaves when dry become furrowed.

111

F. rubra, *Linn.*

CREEPING OF RED SHEEP'S FESCUE.

References.—*Sutton, Permanent and Temporary Pastures, 48; Stebler and Schrotter, The Best Forage Plants, 107.*

Habitat.—A perennial grass, distinguished from the other species of fescue by its creeping habit. It occurs on the Himálaya at moderate elevations.

FODDER. 112

Fodder.—This is said to be one of the few grasses which improve as they get older, the leaves and stems being actually more nutritious, as well

as of superior bulk, at the time of ripening seed than earlier in the season (Sutt n, l c) It thrives on various kinds of soil; and on loose sandy ground and railway embankments it spreads rapidly by means of its underground stems, and serves to bind the soil Royle says that, owing to the greater produce it affords, it is more valued than Sheep's fescue

(G Watt)

FIBRAUREA, *Lour.; Gen Pl I, 960.*

113

Fibraurea tinctoria, *Lour.;* MENISPERMACEÆ, *Fl Br Ind I, 98*

Syn.—FIBRAURA TINCTORIA, FASCICULATA, AND CHLOROLEUCA, *Miers*, COCCULUS FIBRAUREA, *DC.*; MENISPERMUM TINCTORIUM, *Spreng*

Vern.—*Tien-sien tan* and *hoang ten*, CHINESE; *Cay-vang dang*, COCHIN CHINA

References.—*Lour., vol II, 627; Agri-Horti Soc Ind Jour, XI, 142*

Habitat.—An extensive climber, found in the forests of Penang Malacca, Cochin China, and Borneo.

DYE. Stems. 114

F. Trotterii, *Watt, MS.*

115

Vern.—*Napoo*, MANIPUR

Habitat.—An extensive climber, common in the forests of Manipur

he was, however, unable to give a detailed description of the plant, but as only one species (F. tinctoria, *Lour*) has been hitherto published, there seems no doubt this will prove distinct.

Dye.—Major Trotter narrated the process of dyeing from this plant as follows:—"Five chittacks of dry ROOT of the *napoo* plant to be washed clean and beaten into long shreds, then soaked in 2¼ quarts of water for 15 or 20 minutes, when it will be found that the water has become of a yellow colour, this water should be put aside, as it will be required later on Take out the pounded roots and re-steep in the same quantity of fresh water and let stand for 24 hours Then wash the cloth to be dyed clean, thoroughly soak it in the first solution and take out and repeat the process in the second water, leaving the cloth to soak in it for about half an hour; then wring out and steep in half a pint of *Ashoong* (Garcinia pedunculata) water, pressing and flopping it about in the vessel, so that every part of it may become thoroughly saturated with this water, then wring out and dry in the shade."

DYE. Root 116

FIBRES.

117

A detailed list of the fibres and fibrous plants of India will be found in the appendix (See the explanation made under FOODS and also DOMESTIC and SACRED PRODUCTS) It may be here stated that fibres are classified into:—

I.—Vegetable Fibres.

A.—Bark fibres suitable for the higher textile purposes, e.g., Rhea (See R

India,

(See S

322)

The Banyan Tree.

FIBRES.

B.—Bark fibres suitable for the lower textile purposes, *e.g.*, Jute (*See* Corchorus, *Vol II.*, *534—562*). Sun-hemp (*See* **Crotalaria juncea**, *Vol. II.*, *595—614*), and Coir (*Vol. II.*, *415—459*). Manilla-hemp, **Bauhinia** (*See Vol. I.*, *424—425*; *also Selections from Records of the Government of India, Vol. I.*, *183—186*), **Hibiscus**, &c.

C.—Bark fibres suitable for Cordage and Ropes (*See Vol. II.*, *p. 566*).

D.—Paper materials.

E.—Flosses, *e.g.*, Cotton, Silk Cotton, Kapok, &c., &c. (*See Selections from the Records of the Government of India, I.*, *323—339*).

II.—Animal Fibres.

F.—Wool (*See Selections from the Records of the Government of India, Vol. I.*, *23—52*).

G.—Silk.

H.—Hair, Pashm, &c.

III.—Mineral Fibres.

I.—Asbestos, &c. (*See Vol. I.*, *338*).

Certain information will be found under each of these sectional headings, in their respective places in this work; but to discover the descriptions of all the fibrous material of India the enumeration given in the appendix must be consulted, which will afford the key to the numerous articles on fibres scattered throughout the Dictionary.

(*Murray & Watt.*)

FICUS, *Linn.*; *Gen. Pl.*, *III.*, *367*.

A genus of trees, shrubs, or climbers, sometimes epiphytic, comprising about 600 species, mostly tropical, of which, according to Hooker's *Flora of British India*, 112 are Indian.

The chief interest, economically, in the species of FICUS, arises from the fact of their having a milky sap which contains Caoutchouc,—**F. elastica** being one of the sources of the India-rubber of Commerce.

118

Ficus altissima, *Bl. Bijd.*; *Fl. Br. Ind.*, *V.*, *504*; *Wight, Ic.*, *t. 656*; *King, Ficus, 30, t. 30, 30A, 31, 82, 82*[1]; URTICACEÆ.

Syn.—F. LACCIFERA, *Roxb.*; *Wight, Ic.*; *Brandis*; *Kurz*; *Bedd.*; UROSTIGMA ALTISSIMUM, and U. LACCIFERUM, *Miq.*

Vern.—*Bur*, ASSAM.; *Kathal bat*, SYLHET; *Yokdúng*, LEPCHA; *Prob, phegran*, GARO; *Nyaung* (**F. laccifera** according to Kurz), BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 641*; *Brandis, For. Fl., 418*; *Kurz, For. Fl. Burm., II., 441, 442*; *Beddome, For. Man., 223*; *Gamble, Man. Timb., 332.*

Habitat.—A large spreading tree, with few aerial roots. Found in the Tropical Himálaya from Nepal to Bhutan; in the plains and lower hills of the Deccan and Ceylon; and from Assam to Burma and the Andaman Islands. According to Gamble this tree is epiphytic.

CAOUTCHOUC 119

Caoutchouc.—In the *British Burma Gazetteer*, its Caoutchouc is said to be as good as that of **F. elastica**. Brandis remarks of it that it merits further examination. Gamble says it yields caoutchouc more sparingly than **F. elastica**, and of inferior quality. In Sylhet lac is collected from the branches of the tree.

TIMBER. 120

Structure of the Wood.—White, coarse, and soft, perishable (*Kurz*, under **F. laccifera**).

121

[*V.*, *502*.

F. annulata, *Blume*; *King, Ficus, p. 25, Pl. 23, 81 t.*; *Fl. Br. Ind*,

Syn.—FICUS FLAVESCENS and VALIDA, *Bl.*; UROSTIGMA ANNULATUM and FLAVESCENS, *Miq.*

Reference.—*Kurz, For. Fl. Burm., II., 443.*

The Banyan Tree (*Murray & Watt*) FICUS bengalensis.

Habitat.—A large stem-clasping tree, semi-scandent. Found on the plains and lower hills of Burma

Caoutchouc.—Kurz writes that it yields a rather good quality of Caoutchouc. CAOUTCHOUC 122

Structure of the Wood.—Yellowish, turning pale brown, rather heavy, soft, and perishable. TIMBER. 123

Ficus asperima, *Roxb., Fl. Br. Ind., V. 522; Wight, Ic., t. 633* 124

[illegible]

height of 3,000 feet. MEDICINE. Juice. 125

Medicine.—Dymock says the JUICE and the BARK are in Bombay "well known remedies for glandular enlargements of the abdomen, such as liver and spleen." Bark. 126

Domestic Uses.—LEAVES very rough, and used in place of sand paper, both in Gujrat and Ceylon. In Kánara they are employed to polish horns. The YOUNG BRANCHES are said to be jointed and hollow. DOMESTIC Leaves. 127 Young Branches. 128

F. bengalensis, *Linn.; Fl. Br. Ind., V. 499; Wight, Ic., t. 1989; King, Ficus, pp. 18 & 19, Pl. 13, 81.* 129

THE BANYAN TREE, *Eng.*; ARBOR DE RAIS (a tree of roots), *Port.*

Syn.—F. INDICA, *Linn. in part (Amœn.)*; UROSTIGMA BENGALENSE, *Gasp.*

The word Banyan, according to Yule and Burnell, appears to have [illegible]

[illegible]

SANS. [illegible]

References.—*Roxb., Fl. Ind., Ed. C.B.C., 639; Brandis, For. Fl., 412; Kurz, For. Fl. Burm., II., 440; Beddome, For. Man., 223; Gamble, Man. Tim.* [illegible]

FICUS bengalensis.

The Banyan Tree.

[illegible] IX., 267; X., [illegible]; XII., [illegible]; Smith, Dic., [illegible] ... Settlement Report, South Arcot, [illegible] ... Shahjahanpur, [illegible] ... Nimar, 27.

Habitat.—A large tree, wild in the Sub-Himálayan tract and lower slopes of the Deccan, planted throughout India. **Mr. J. Cameron** writes that the tree is so common in Mysore that it may be said to be characteristic of the arboreal vegetation of many parts of that province.

It attains a height of 70 to 100 feet, and sends down roots from its branches, which support it in its expanding horizontal growth. The branches formed by the aerial roots may often be seen to increase in thickness as they spread away from the central axis, and here and there this occurs to such an extent as to form auxiliary stems. The tree originates usually from the germination of seeds dropped by birds on other trees. Very often, owing to the moisture collected in the sheaths formed by the axils of the leaves of palms (particularly the Palmyra and Date), the Fig may be observed embracing, until it strangles, a crown of palm leaves which are seen to grow from the centre of the Banyan. The death of the supporting palm, leaves a decaying central mass, which in time (or with the maturity of the Banyan) results in the death of the original axis, but the daughter axes continue their forest-like expansion until an area is embraced sufficient to afford shade for many thousand people. **Colonel Sykes** described a very large Banyan which grew on an island in the River Nerbudda. This was known as the Kabirbar, and was probably the large tree described by **Nearchus**. In the *Poona Gazetteer* (Vol. XVIII., Pt. I., p. 51) a Banyan is spoken of in the Andhra valley, so large as to afford shade to 20,000 people. **Forbes** describes its circumference as of 2,000 feet, and its overhanging branches, beyond the daughter stems, as stretching over a much larger area. It had about 320 large trunks and over 3,000 smaller, and was capable of sheltering 7,000 men. High floods have, however, since carried away portions of the island, and with these sections of this great tree. Better known examples are the famous Banyan in the Royal Botanic Gardens, Calcutta, and the Satara one in Bombay. **Dr. King** describes the Calcutta banyan as about 100 years old, and as possessing 232 aerial roots. The main or parent trunk of this remarkable tree, he says, has a girth of 42 feet; the circumference of its leafy crown being 857 feet. It is, however, still growing vigorously, and as **Dr. King** remarks, "there is no reason why it should not go on increasing indefinitely." It is known to have taken its birth about the year 1782, on a sacred date-palm. **Mr. Warner** describes the Satara banyan—a still larger example than the Calcutta one. In 1882 its circumference was 1,587 feet, its length from north to south 595 feet, and from east to west 442 feet.

The Banyan is a favourite road-side tree and is accordingly largely planted for shade. In the Panjáb the young trees are said to require protection from frost. Both this tree and **F. religiosa** effect serious destruction to buildings, especially in Bengal. Bird-droppings, containing the seeds from the fruits, germinate on the walls of temples and other buildings,

and owing to the superstition of the people, these can only be removed [illegible] ...an). Valentia (1809) [illegible] a tax owing to the number of the oil bearing seeds of Calophyllum inophyllum, dropped by the flying-foxes who lived in the Banyan trees - the owners of these trees not [illegible] Calophyllum [illegible]

CAOUTCHOUC 130

(a [illegible] the natives [illegible] Buchanan [illegible] e," he says, [illegible] making inci- [illegible] weight of mustard seed oil. It is then fit for use"

FIBRE. Bark. 131 Aerial roots. 132

Fibre.—A coarse rope is prepared from the BARK and from the AERIAL ROOTS. Paper is also reported to have been formerly largely prepared in Assam from the bark, and to a small extent it is still so prepared at Lakhimpore and in Bellary in Madras. This fibre was used by the Sikhs as a slow-match. The length of the ultimate fibres has, by Cross, Bevan, and King been ascertained to be 1—3 m m. The fibres obtained from the genus Ficus contain from 40 to 60 per cent of cellulose, and under hydrolysis lose from 20 to 40 per cent of their weight. Chemically they are therefore worthless fibres. (*See* F. infectoria *and* F. religiosa.)

SPECIAL OPINIONS AS TO FIBRE.—§ "The inner bark is an article of common use for cordage, &c., in the rural districts" (*J. Cameron, Superintendent, Botanical Garden, Bangalore*). "Used for tying bundles of wood, &c." (*Dr. Dymock, Bombay.*)

MEDICINE. Juice. 133 Bark. 134 Seeds. 135 Leaves. 136 Root. 137

Medicine.—The MILKY JUICE is externally applied for pains and bruises and as an anodyne application in rheumatism and lumbago. It is considered as a valuable application to the soles of the feet when cracked or inflamed, and is also applied to the teeth and gums as a remedy for tooth-ache. An infusion of the BARK is supposed to be a powerful tonic and is considered to have specific properties in the treatment of diabetes. The SEEDS are deemed cooling and tonic. The LEAVES are applied, heated as a poultice, to abscesses, and after they have turned yellow are given with roasted rice in decoction as a diaphoretic. The [illegible] the Panjáb, being considered by [illegible] on of the small branches is useful in hæmoptysis" (*Civil Surgeon J. Anderson, M.B., Bijnor*). "The tender ends of the hanging roots are given for obstinate vomiting" (*Surgeon-Major Roth, Civil Surgeon, Ahmedabad*). "The concentrated juice is much used by natives in combination with fruit as an aphrodisiac, also in spermatorrhœa and gonorrhœa" (*Narain Mitter, Kathe Bazar Dispensary, Hazaribagh.*) "The young buds are said to be astringent and useful in diarrhœa" (*Civil Medical Officer U. C. Dutt, Serampore*). "Really useful in cracked heels" (*Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces*). "A small quantity of the milky juice is taken early in the morning in dysentery. The milky juice is a good astringent" (*Surgeon W. F. Thomas, Madras Army, Mangalore*).

FOOD. Fruit. 138 FODDER Leaves. 139 Young Twigs. 140

Food and Fodder.—The small red FIGS are often eaten by the poorer [illegible]

FICUS Benjamina.

The Banyan Tree.

TIMBER. 141

Structure of the Wood.—Grey, moderately hard; no heartwood. Weight about 37lb. It is of little value, but is durable under water, and therefore used for well-curbs. It is sometimes employed for boxes and door panels. The wood of the drops is stronger and is used for tent-poles, cart-yokes, and banghy-poles (*Gamble*). **Kurz** and **Brandis** describe the wood as whitish, open-grained, and soft.

DOMESTIC. Leaves. 142 Juice. 143

Domestic Uses.—The LEAVES are much in demand as plates. The milky JUICE is in Lahore employed to aid in the oxidation of copper.

SACRED. 144

Sacred Uses.—According to Hindu mythology, Bráhma was transformed into a *Vada* tree. **Dr. Buchanan** says that the Banyan is viewed as the male to the Peepul. It is regarded as a sin to destroy either of these trees, but more especially the male. It is meritorious to plant a young male close to the female, and this is done with a ceremony somewhat similar to that of marriage. It is customary, he adds, to place a piece of silver money under the roots of the young Banyan tree. So superstitious are the Hindus against cutting down the Banyan tree, that a Mr. T. Marsden, of the Madras Engineers, is said to have been poisoned by the Brahmans of Triplasore, in 1771, because he had cut down a Banyan tree during the construction of the fort. **Lisboa** writes that the dry twigs are used as *Samidhas* for producing sacred fire. The leaves are employed as one of the *Panch pallavs* or platters, and also for pouring libations. In the *Vratrág* females are ordered to worship this tree on *Jesht shudh* 15th (May), to water it, to wind a thread round it, and to worship it with *gandh* flowers, &c. (? the Indian Marigold—see *Vol. II., p. 24 and p. 272;* also **Tagetes erecta.** On the Himálaya the introduced but now completely naturalised **Dahlia** is similarly used). They are further ordered to make *Pradakshanas* (*i.e*, to go round it a certain number of times, to praise it, and to pray to it for the survival of their husbands and for the fulfilment of their wishes). They are told that by worshipping this tree they attain one of the heavens—*Shivloke*. They are encouraged to this worship by the tradition that *Savitri*, the wife of *Satyawan*, got back her deceased husband through the adoration of this tree. They are recommended to perform the thread ceremony of this tree and its marriage with the *Durva* plant—**Cynodon Dactylon.**

The umbrella poles often used at ceremonies are made of the wood of the aerial roots, and the young thin roots are by the Santals and other aboriginal tribes of Chutia Nagpur wound around the neck as a charm to ensure conception.

145

Ficus Benjamina, *Linn.; Fl. Br. Ind., V., 508; Wight, Ic., t. 658.*

Syn.—FICUS COMOSA, *Roxb.; Beddome; Wight, Ic.;* F. PENDULA, *Link.;* F. PAPYRIFERA, *Griff.; Icon. Pl. As., t. 554;* UROSTIGMA NUDUM, *Miq.;* U. BENJAMINA, *Miq.;* FICUS NUDA, *Miq.;* F. BENJAMINA, *Linn.; var.* COMOSA, *Kurz.*

Vern.—*Sunonijar*, SANTAL; *Juripakri*, ASSAM; *Kabra*, NEPAL; *Kunhip*, LEPCHA; *Pimpri*, BOMB.; *Jili*, CHUTIA NAGPUR; *Pútra-jauvi*, TEL.; *Jili*, MALAY; *Nyaung-thabieh*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 644; Brandis, For. Fl., 417; Kurz, For. Fl. Burm., II., 446; Beddome, Fl. Sylv., II., 223; Gamble, Man. Timb., 338; Dalz. & Gibs., Bomb. Fl., 242; King, Ficus, 43; Elliot, Flor. Andhr., 161; Drury, U. Pl., 214; Gamble, Trees, Shrubs, &c., Darjeeling, 74.*

Habitat.—A moderate-sized, evergreen, often epiphytic tree, cultivated in the Malay Peninsula, wild (*var.* **comosa** only) along the base of the Eastern Himálaya, to Assam, Chittagong, Burma, the Andaman Islands, and the Deccan.

MEDICINE. Leaves. 146

Medicine.—According to **Drury** a decoction of the LEAVES mixed with oil is believed in Malabar to be a good application to ulcers.

Structure of the Wood.—Grey, beautifully mottled, moderately hard. Weight, 34lb per cubic foot.

TIMBER. 147

Lac.—Gamble writes that lac is produced on this species in Assam.

LAC. 148

Ficus Carica, *Linn.; Brandis, For. Fl., 418; Aitchison, Afgh. Delim. Rept., Pl. 46.*

149

THE FIG.

Vern.—*Anjir*, HIND.; *Anjir*, BENG.; *Kimri, fagu, faguri, fagari*, PB.; *Anjira*, BOMB.; *Anjir*, GUZ.; *Anjura*, or *anjuri*, KAN.; *Tse thse*, BURM.; *Anjira*, SANS.; *Teen*, ARAB.; *Anjir*, PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 635; Gamble, Man. Timb., 333; Stewart, Pb. Pl., 211; DC., Origin Cult. Pl., 295; King, Ficus, 147;*

Habitat.—Cultivated in many parts of India, more especially in the North Western Provinces, the Panjáb, the Western Himalaya, Sind, and Beluchistan. Reports have been received of its cultivation in Bombay, Madras, Burma, and the Andaman Islands. In some of the references, however, room for doubt seems to exist as to their really referring to this species. Dr. Aitchison thinks F. Carica is probably a native of Afghánistan and Persia. It is indigenous, he says, in the Badghis country and Eastern Persia. According to DeCandolle, "the prehistoric area of the

Cultivation.—In the Bombay Experimental Farm reports repeated mention is made of the cultivation of this fig, but the following special report by the Director of Land Records and Agriculture, Bombay, gives the results of the experience gained at Poona:—

CULTIVATION. 150

"In 1887-88 the area under figs amounted to 271 acres. With the exception of a few acres in Surat, Ahmadnagar, and Belgaum, almost the whole area was confined to Poona. There are two varieties—dark purple and greenish. The tree grows from 6 to 7 feet high.

"The fig tree does not require very rich soil. Alluvial or loamy soil of yellow or reddish brown colour, with a rocky or *murum* bed 3 or 4 feet below the surface, is best suited to its growth. The rocky or *murum* bed prevents the roots from penetrating deep into the soil, and favours the side growth of rootlets, which is very desirable. Fig trees also thrive in clayey soil, but the land must not be water-logged. Rich black soil is

FICUS Carica.

The Fig.

CULTIVATION.

[illegible] to fig trees. In it the plant grows tall and runs to leaf, and the fruit [illegible] in size and taste.

"[illegible] requires a mixed manure, about 10 to 12 cart-loads for the [illegible]. The [illegible] of the mixture are town sweepings, sheep-droppings, [illegible], and others. The use of each of these ingredients [illegible]. Sheep-droppings make the skin of the [illegible] dung causes a disease [illegible]. The [illegible] by themselves is considered injurious to the plant. Dry fish forms a very good manure but is not [illegible]. Poudrette has not yet been tried.

"The plants are raised from cuttings ½ to 1 inch thick and a foot [illegible], planted in rows 10 to 12 inches apart in a richly [illegible] plot. The cuttings should be put into the ground as [illegible] and should be watered every eighth, [illegible] tenth day as necessary. In about two months they begin to throw roots and shoots and [illegible] a few leaves. If they are properly taken care of the plants after a year become fit for transplantation, [illegible] they take from 10 to 12 months more. The best season for transplanting is July-August. To allow of free growth and to prevent [illegible] injury from shade, the plants should be at least 12 to 14 feet apart. About [illegible] plants go to an acre.

"At the end of every August, when there is a break in the rains, the [illegible] the roots of the plants should be turned up and loosened, the outermost roots cut and the remaining roots exposed to the sun for four [illegible] days. The roots should then be covered with a little earth and [illegible] basketfuls of manure, and the plants watered. The whole operation should not extend over a fortnight. A little manure is sometimes applied but none should be given after October. From the beginning of March to the end of May the soil should be slightly turned and cleared every fortnight. In this way the soil should be dressed about 21 to 25 times a year. If the plant turns to wood and leaf and does not bear, it should be pruned, slightly manured, and watered every eighth day.

"The fig tree requires careful watering. In the fruiting season, the failure of a single weekly watering reduces the outturn. The quantity of water should also be gradually increased, and the period between two waterings should begin with four days and end with eight days, having an intermediate period of six days. The watering should commence with September and end with the fruiting season. During the first two years light crops may be raised between the lines of fig trees. In the first year, onions, garlic, and other vegetables may be cropped, and in the second year, radish and fenugreek. But from the third year, when the plant begins to bear, no crop should be raised. The plant begins to bear in the second or third year after transplantation. But the full crop can be gathered only from the fourth year. The tree continues to bear from 12 to 15 years; and 20 years is the utmost limit, after which the tree generally dries up. Vigorous growth of the plant in September-October is a sure indication of a good crop. The tree fruits twice a year. The first season commences in June-July, but the crop is not allowed to ripen, as it, besides being sour in taste, injures the second crop, which is by far the most valuable. The first crop is gathered green and is sold as an inferior vegetable. The second season commences in January and lasts till the commencement of the monsoon. The first takes about two months to mature. If a tree has fruited too thickly to allow all the fruits to attain good size, the crop is thinned. But this thinning must be done by experienced hands. A full-grown tree, which is 6 to 9

feet [illegible]
he [illegible]
[illegible]

F[illegible] [illegible]
F cord[illegible] [illegible]
F C[illegible] [illegible]
Syn. [illegible]
Vern. [illegible]

FICUS foveolata.

The Caoutchouc of Indian Commerce.

N.-W. P., Pt. V., 81; Report on the Shan States by Mr. Aplin; For. Ad. Report, Chutia Nagpur, 1885, 6, 33; Ind. For., III., 205; VI., 218; VIII., 82; X., 222, 325; XI., 4; Bom. Gaz., III., 202.

GUM. 157

Habitat.—A moderate-sized tree of the sub-Himálayan tract, from the Chenab eastward to Bengal and Burma; ascending to 4,000 feet in altitude.

Gum.—Lac is produced on the tree.

FIBRE. Bark. 158

Fibre.—The BARK is used to tie the rafters of native houses. Mr. Campbell says it affords a good strong fibre useful for ropes.

MEDICINE. Fruit. 159 Bark. 160 Roots. 161

Medicine.—The FRUIT is given in aphthous complaints. A bath made from the fruit and BARK is a cure for leprosy (*Rheede*). The juice from the ROOTS is given in bladder complaints, and boiled in milk in visceral obstructions (*Rev. A. Campbell*).

FOOD. Fruit. 162

Food.—The FRUIT is eaten and is said to be good, though somewhat insipid. According to Stewart, however, it is not eatable.

TIMBER. 163

Structure of the Wood.—Rough, moderately hard, greyish-brown. Weight 31lb per cubic foot. It is not used economically.

DOMESTIC. Leaves. 164

Domestic Uses.—The LEAVES are rough, and are consequently employed in place of sand-paper.

165

Ficus elastica, *Roxb.; Fl. Br. Ind., V., 508; King, Ficus, p. 45, Pl. [54; Wight, Ic., 663.*

Syn.—UROSTIGMA ELASTICUM, *Miq.*; VISIANIA ELASTICA, *Gasp.*

Vern.—*Bor, attah bar*, BENG.; *Kagiri, kasmir*, KHASIA; *Bar, attah bar*, ASSAM; *Kauket*, GARO; *Lesu*, NEPAL; *Yok*, LEPCHA; *Nyaung bawdi*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 640; Brandis, For. Fl., 417; Kurz, For. Fl. Burm., II., 444; Gamble, Man. Timb., 336; Stewart, Pb. Pl., 212; Mason, Burma and its People, 523, 776; Lisboa, U. Pl. Bomb., 130; Christy, Com. Pl. and Drugs, VI., 53; VII., 25; Liotard, Dyes, 33; Watson, Report on Gums, 34; Kew Off. Guide to the Mus. of Ec. Bot., 122; Kew Off. Guide to Bot. Gardens and Arboretum, 69; Bomb. Gaz., 404; Burm. Gaz., 124; Trans. Agri. Hort. Soc., Vol. IV., 221; Indian Forester, I., 86, 124, 126, 127, 129, 132, 133, 134, 136, 138, 139-141, 188; III., 46; IV., 40, 41; V., 190; VI., 49, 50; VII., 101, 241-243; VIII., 203; IX., 225; X., 403; XI., 256, 354, 485, 487; XII., 563; XIII., 550; XIV., 297; Special Reports: Conserv., Forests, South Circle, Madras; Conserv., South Circle, Bombay; Conserv. of Sind; Conserv. of Bengal (Chittagong); Official Correspondence and Reports: Assam Forest Reports from 1873-74 to 1887-88.*

Habitat.—A large evergreen tree, usually epiphytic, throwing down numerous aerial roots from the branches. It occurs in damp forests from the base of the Sikkim Himálaya eastward to Assam and Arracan. There are large Government plantations in Assam, and it is also being cultivated in other provinces. Kurz remarks that it is frequent in Upper Burma, "where whole forests of the species are said to exist in the valley of Hookhoom."

For the cultivation of this and other Caoutchouc-yielding plants, see the account under INDIA-RUBBER.

GUM. 166

Gum.—The tree yields the Caoutchouc of Indian commerce.

TIMBER. 167

Structure of the Wood.—White or light brown. Weight 43lb per cubic foot. It is not used.

168

F. foveolata, *Wall.; Fl. Br. Ind., V., 528; King, Ficus, p. 133-135; Pll. 166, 167, and 168; Griff., Icon. Pl. As., t. 561.*

Syn.—FICUS PUBIGERA, *Wall.*; *Brandis, Kurz*; F. EREATA, *Miq.* (*non Thunb.*); F. THUNBERGII, *Maxim.*; F. IMPRESSA, *Benth.*; F. LUDUCCA, *Roxb.*; F. LUDENS, *Wall.*; F. WRIGHTII, *Benth.*

Vern.—*Dudika*, NEPAL; *Taksot*, LEPCHA; *Bat phagár, nágár jamán, thaur, phogri, dúdagrú, mambre, dúgurú, shirúli, mathúgar, karmbal,*

garelú (these names are given by Stewart for F reticulata, *Miq*, which Brandis regards as F foveolata, *Wall*), PB, *Grelu*, SIMLA, *Makreru*, KUNAWAR

References —*Brandis For Fl*, 423, 424, *Kurz, For Fl Burm*, II, 450, *Gamble, Man Timb*, 359 *Stewart Pb Pl* 214

Habitat —An evergreen scandent shrub found in the Himálaya, from Chumba to Bhutan, altitude 2,000 to 7,000 feet, also the Khasia Hills and Burma

FODDER. 169 Fodder —Stewart says of his F reticulata that it is browsed by goats

TIMBER. 170 Structure of the Wood —Light brown, soft, very porous Weight 38lb per cubic foot

171 **Ficus gibbosa**, *Blume, Fl Br Ind*, V., 495, *King, Ficus* 4, *Pl* [2, *Wight, Ic*, t 650, 651, 652

Syn —F UNIGIBBA, *Miq*, F RIGIDA, PARADOXA, and CUNEATA *Blume*, F ALTIMERALOO, *Roxb MSS*, F EXCELSA, *Vahl* ? in *Roxb*, *Fl Ind Kurz For Fl Burm*

The *Flora of British India* describes four varieties of this plant as follows —

172 α F gibbosa, *Blume* Malay Peninsula

173 β F cuspidifera, *Miq* Throughout India

Syn —F EXCELSA, *Wall* F RETICULOSA, *Miq*

174 γ F parasitica, *Koen* Central India, Behar, &c.

Syn.—F AMPELOS *Koen* F SCLEROPHYLLA, *Roxb*, UROSTIGMA VOLUBILE *Dalz*, U AMPELOS *Dalz & Gibs*

175 δ F tuberculata, *Roxb* Western Ghats

Syn —F ANGULATA *Miq*

Vern —*Datir*, BOMB, *Umbar*, GUZ, *Kouda juvee*, *tellabarinka*, TEL, *Attiméralú*, MALAY, *Udumber*, SANS

Re[illegible]

[illegible]

MEDICINE. Root. 176 Root bark 177

DOMESTIC Leaves 178

179 **F. glomerata**, *Roxb*, *Fl Br Ind*, *V* 535, *Roxb*, *Corom Pl*, *II No* 123, *Wight Ic*, 667; *King, Ficus, pp* 173 174, *Pll*, 218, 219; *Brandis, For Fl Pl*, 49

Syn —F CHITTAGONGA *Miq*, F RACEMOSA, *Wall* (*non Roxb*), F MOLLIS, *Miq* (*non Vahl*), F GOOLEREEA, *Roxb*; COVELLIA GLOMERATA, *Miq*

Vern —*Gular paroa, lelka, umar, umrai tue, dimeri*, HIND, *Jagya du mar* (Gamble), *Yajnadumbar* (U C Dutt), BENG, *Lowa lóa* [illegible]

[illegible]

Udumbara, SANS.

The Chandarasa Gum.

References.—*Roxb., Fl. Ind, Ed. B.C.C., 646, 639; Brandis, For. Fl., 422; Kurz, For. Fl. Burm., II., 458; Beddome, Fl. Sylv., 224; Gamble, Man. Timb. 339; Thwaites, En. Ceylon Pl., 267; Dalz. & Gibs., Bomb. Fl., 243; Stewart, Pb. Pl., 212; Rev. A. Campbell, Rep. Econ. Prod., Chutia Nagpur, No. 7531; Elliot, Fl. Andh., 18, 28, 114, 141; Mason, Burma and its People, 460, 776; Sir William Jones, V., 159, No. 72; Ainslie, Mat. Ind., II., 30; U. C. Dutt, Mat, Med. Hind. 235, 321, 324; Dymock, Mat. Med. W. Ind., 2nd Ed., 744; Baden Powell, Pb. Pr., 377; Atkinson, Him. Dist, 317, 737.; N. W. P. Econ. Prod., Pt. V., 84; Lisboa, U. Pl. Bomb., 131, 204, 278, 282, 290; McCann, Dyes and Tans, Beng., 136, 144; Watson, Report on Gum, 61; Special Report, Baroda Durbar, No. 109; Balfour, Cyclop, I., 1100; Journ. Agri.-Hort., 1885, VII., (New Series), 276; Indian Forester: I., 23, 273; III., 205, 236; IV., 321; V., 471; VII., 232; VIII., 35, 411; IX., 222, 325; XII., App., 21, 28; XIII., 121; XIV., 144, 371; Settlement Reports: N. W. P., Shahjehanpur, p. ix.; C. P.: Chindwara, 110; Seonee, 10; Baitool, 127; Chanda, App. VI.; Bhundara, 19; Hoshungabad, 179; Nimar, 307; Raepur, 76, 77; Punjab: Simla, App. II., p. xliv; Kohat, 29—30; Peshawar, 26; Manuals and Gazetteers: Trichinopoly, 78; Coimbatore, 247; Orissa, II., 179, App. VI.; Bombay, III., 199; V, 283; VII., 38, 40, 43; XI., 24; XII., 28; XIII., 27; XV, 69; XVI., 16; XVII 26; Mysore and Coorg, I., 70, 434; N. W. P., III., 33, 248; IV., lxxvii; For. Admn. Rep., Ch. Nagpur, 1885, 633.*

Habitat.—A large tree of the Salt Range and Rajputana along the sub-Himálayan tracts to Bengal, Central and South India, Assam and Burma.

GUM. 180

Gum.—In Chanda it is said a gum (*sic*) is obtained from this tree (*Settle. Report*). The *Mysore and Coorg Gazetteer*, referring probably to the same substances, says a gum known as *Chandarasa* is prepared from the milky juice. In both these passages the word Caoutchouc should probably be substituted for *gum*.

The lac insect is reported to occasionally frequent the tree. Brandis remarks that it abounds in a milky juice from which bird-lime is prepared.

DYE. 181

Dye.—This tree is said to afford a dye (*C. P. Gaz.*, *419*). McCann says that the bark, under the name of *goolur*, is mentioned as one of the in gredients used in Lohárdagá in preparing a good black dye.

MEDICINE. Leaves. 182 Bark. 183 Fruit. 184 Root. 185 Galls. 186 Milky Juice. 187

Medicine.—The LEAVES, BARK, and FRUIT are employed in native medicine. The bark is given as an astringent and a wash for wounds. It is also employed to remove the poison from wounds made by a tiger or cat. The ROOT is useful in dysentery, and a fluid obtained from it by incision is administered as a powerful tonic. Ainslie speaks of this fluid as *attie vayrtannie*—a powerful tonic when drunk for several days together. The leaves reduced to powder and mixed with honey are given in bilious affections. The small blister-like GALLS common on the leaves, soaked in milk and mixed with honey are given to prevent pitting in small-pox (*Atkinson*). The figs are considered astringent, stomachic and carminative, and are given in menorrhagia and hæmoptysis. The MILKY JUICE is administered in piles and diarrhœa, and in combination with sesamum oil in cancer. The fresh juice of the ripe fruit is used as an adjunct to a metallic preparation which is given in diabetes and other urinary diseases. In the Trichinopoly Manual it is said "a juice is extracted from the trunk which is used by the natives in cases of diabetes." In the Baroda Durbar report of the drugs shown at the Colonial and Indian Exhibition, "the SAP" is said to be used "locally applied to mumps and other inflammatory glandular enlargements." Dr. Dymock also alludes to this application, and adds that it is employed in gonorrhœa in doses of four *tolas*. The Settlement Report of the Chanda district adds that it is used as an application to wounds.

Sap. 188

The bark is given to cattle when suffering from rinderpest. It is ground with onions, cummin, and cocoa-nut spathes and mixed with vinegar. (*Coimbatore Dist. Man.*).

SPECIAL OPINIONS § —"Used in cases of spongy gums to harden

MEDICINE.

Bangalore)

Food —The FRUIT (which ripens from April to July) is very inferior, but is occasionally, says Stewart, eaten raw and in curries by the poor.

FOOD Fruit. 189

FODDER. Fruit. 190 Leaves 191

TIMBER. 192

Structure of the Wood ... section ... Weight 25 to 30lb (*Gamb* ... light and perishable (*Kurz*) It is n... r water, and is consequently used ... nopoly it is said to be used for building purposes, but it is described as brittle and

nagar it is said to be employed for planks and shutters

Sacred —In the *Baroda Gazetteer* it is stated that there is a common belief that near every *umbar* tree there runs a hidden stream The tree is regarded as sacred

SACRED. 193

[*636, 659, 661, King, Ficus, pp 75 77, Pl, 94*

Ficus heterophylla, *Linn f, Fl Br Ind, V, 518, Wight, Ic, t*

194

Syn —FICUS TRUNCATA, DENTICULATA, RUFESCENS, *Vahl*, F TRUNCATA, REPENS, RUFESCENS *Ham*, F AQUATICA, *Kœnig* F SCABRELLA and HETEROPHYLLA, *Roxb*, F REPENS, *Willd*, *Roxb*, F RUBIFOLIA, *Griff*

Vern —*Gaori shiora, balabahula, baloluta, ghoti suara bhui-dumúr*, BENG, ... TEL, *Valli*

... *indis, For Fl*, *Bomb Fl, 243*, ... *4, U C Dutt*, ... *eer, Mysore &*

Habitat —A creeping pubescent shrub common along the banks of larger rivers throughout the hotter parts of India and Burma from Chittagong and Ava down to Upper Tenasserim Distributed southward to Perak and Ceylon

195 196

The *Flora of British India* refers the polymorphous forms of this species to two varieties —

F scabrella, *Roxb* characteristic of Chittagong —*Roxburgh*

F repens, *Willd*

Medicine —The JUICE of the ROOT of this shrub is internally administered in colic pains, and the juice of the LEAVES mixed with milk in dysentery The BARK of the root, which is very bitter, pulverised and

MEDICINE Juice. 197 Root. 198 Leaves 199 Root-bark. 200

FICUS hispida.

A Useful Emetic.

mixed with coriander seed, is considered a good remedy in coughs and asthma, and similar affections of the chest (*Rheede*).

FOOD. Fruit. 201

Food.—The FRUIT of scabrella is eaten by the natives of Chittagong in curries (*Roxb.*).

202

Ficus hispida, *Linn., f.; Fl. Br. Ind., V., 522; King, Ficus, Plates* [*154, 155; Wight, Ic., t. 638, 641.*

Syn.—FICUS OPPOSITIFOLIA, *Willd.; Roxb., Corom. Pl., t. 124;* F. PROMINEUS, *Wall.;* F. DŒMONUM, *Kœnig;* F. MOLLIS, *Willd.;* COVELLIA DŒMONUM, *Miq.; Dalz & Gibs.*

Vern.—*Kagsha, gobla, totmila, kat-gularia, konea-dumbar,* HIND.; *Dumar, kako-dumar, kak-dumar,* BENG.; *Bhudoi,* CHUTIA NAGPUR; *Kotang, sosokera,* KOL; *Sita pordóh,* SANTAL; *Khoskadumar,* ASSAM; *Shakab,* GARO; *Korch,* KURKU; *Kharwa,* NEPAL; *Kharwa,* PAHARI; *Taksot,* LEPCHA; *Poksha,* MICHI; *Maiu-lok,* MAGH; *Bhudoi,* MAL (S.P.); *Katumer, bomair,* GOND; *Kagsha, kagoha, dhúra, gobla, tomila,* KUMAON; *Dadúri, degar, rúmbal,* PB.; *Katumbri,* C. P.; *Rambal, dumbar, mira, dhedu,* BOMB.; *Kharawat,* MAR.; *Dhe daumaro, jangli angir,* GUZ.; *Dhedumera,* PANCH MEHALS; *Pe-attiss* (Moodeen Sheriff), TAM.; *Boda-mamadi, bomma-médi, brahma-médi, bummarri, bamari, korasana,* TEL.; *Adavi-atti,* KAN.; *Pe-yatti paraka,* MALAY.; *Kadut, kadot,* BURM.; *Kota-dimbula,* SING.; *Kákadumbar, ummiatto-dumbara,* SANS.; *Tine-barri,* ARAB.; *Anjir-dashte,* PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 647; Brandis, For. Fl., 423; Kurz, For. Fl. Burm., II., 460; Beddome, For. Man, 224; Gamble, Man. Timb., 340; Trees, Shrubs, &c., Darjeeling, 76; Dalz. & Gibs., Bomb. Fl., 243, 244; Elliot, Flora Andh., pp. 28, 30, 31, 77, 98; Trimen, Syst. Cat. Pl. Ceylon, 84; Pharm. Ind., 217; Moodeen Sheriff, Supp. Pharm. Ind., 143; U. C. Dutt, Mat. Med. Hind., 301; Dymock, Mat. Med. W. Ind., 2nd Ed., 745; Atkinson, Him. Dist., 737; Drury, U. Pl., 216; Lisboa, U. Pl. Bomb., 131; Balfour, Cyclop, I., 1101; Home Dept. Cor. regarding Pharm. Ind., p. 240; Indian Forester, X., 325; XIV., 391.*

Habitat.—A moderate-sized tree or shrub, common throughout the outer Himálaya from the Chenab eastward, ascending to 3,500 feet; Bengal, Central and South India, Burma, and the Andaman Islands. Distributed to Malacca, Ceylon, China, and Australia.

FIBRE. Bark. 203

Fibre.—Dr. Dymock informs the writer that in Bombay (especially near the coast) a fibre is prepared from the BARK which is used for tying bundles.

MEDICINE. Fruit. 204 Seeds. 205 Bark. 206 Milk. 207

Medicine.—The FRUIT, SEEDS, and BARK are possessed of valuable emetic properties followed by more or less purging. This property was first brought to notice by Dr. Moodeen Sheriff. The acrid MILK obtainable from this species is used medicinally in Kangra. The bark, in doses of from 15 to 30 grains, three or four times daily, is stated to act effectually as an antiperiodic, and in half these quantities as a good tonic (*Pharm. Ind.*). In Bombay and the Concan the powdered fruit heated with water to form a poultice is applied to buboes. It is also given to milch cattle to dry up their milk (*Dr. Dymock*).

SPECIAL OPINIONS.—§ "According to Sanskrit writers the figs of this plant promote the secretion of milk. They are also supposed to preserve the fœtus in the womb" (*U. C. Dutt, Civil Medical Officer, Serampore*). "I have been using the fruit, seeds, and bark of Ficus hispida occasionally in my practice ever since I first found them in 1867 to possess the emetic property. They are good emetics, and act efficiently if assisted with warm water and tickling of the throat. The seeds of the ripe fruit should be dried and preserved from moisture in stoppered bottles, reduced to a powder when required, and administered in one-drachm doses. The bark is a stronger emetic, but its action is sometimes attended with more or less purging. Its dose is from forty grains to a drachm. The dose of

The Citron-leaved Ficus. (Murray & Watt) | FICUS infectoria.

the ripe and fresh fruit is from four to six" (Honorary Surgeon Moodeen

small and covered with short

The LEAVES are lopped

FOOD. Fruit. 208

FODDER. Leaves. 209

y, no heartwood, no annual rings. Weight 25 to 35 lb Put to no economic use

TIMBER. 210

Domestic Uses.—According to Balfour this is one of the most destructive of figs to buildings.

DOMESTIC. 211

[39, 40, Pl 45, 836

Ficus indica, Linn, Sp. Pl.; Fl. Br. Ind, V, 506, King, Ficus, pp

212

Syn.—FICUS SUNDAICA & RUBESCENS, Bl; UROSTIGMA RUBESCENS,

Habits

It seems

F. bengalensis may probably refer to this species Until recently, in popular works, F. indica has been treated as a synonym for F. bengalensis.

[t 665; King, Ficus, 60, t 75 to 79

F. infectoria, Roxb (non Willd), Fl Br Ind V 515, Wight, Ic,

213

Ham, F LUCES-

s occur, of which three are Indian".—

F. infectoria, proper. 214

F. Lambertiana, Miq. 215

Syn.—UROSTIGMA LAMBERTIANUM, Dals & Gibs.

A tree of Western and Central India 216

F. Wightiana, Wall, Bedd, For. Man, 222.

parkati, SANS

References.—Roxb, Fl Ind, Ed CBC, 643, Brandis, For. Fl, 414,

w tree (Fl Br Ind),

four Himálaya; the plains

ally

opes

FIBRE. Bark. 217

 A Burmese Caoutchouc-yielding Plant.

MEDICINE. Bark. 218

Medicine.—The BARK of this, along with the barks of other four species of Ficus and of Melia Azadarachta, pass by the name of *Panchaval kala* (or the five barks); they are used in combination. A decoction is much employed as a gargle in salivation, as a wash for ulcers, and as an injection in leucorrhœa.

FOOD. Young shoots. 219 FODDER. Leaves. 220 TIMBER. 221 DOMESTIC. 222

Food and Fodder.—The YOUNG SHOOTS are said to be eaten in curries by the natives. The LEAVES make good elephant and cattle fodder. (*Brandis*).

Structure of the Wood.—Grey, moderately hard. Weight about 35lb; not durable. It is used in Assam and Cachar to make charcoal, but according to Roxburgh it is useless even for firewood.

Domestic Uses.—A good avenue tree and planted for ornamental purposes.

Ficus laccifera, *Roxb.* see **F. altissima.**

223

F. mysorensis, *Heyne, Fl. Br. Ind., V., 500; King, Ficus, 19, t.* [*14, 15, 81.*

Syn.—F. INDICA, *Linn.*, in part; F. COTONIÆFOLIA, *Vahl.*; F. CITRIFOLIA, *Willd.*; F. GONIA, *Ham.*; UROSTIGMA MYSORENSE, *Miq.*; U. DASYCARPUM, *Miq.*; F. SUBREPANDA, *Wall.*; F. TOMENTOSA, *Hort. Madr.*; *Rheede, Hort. Mal., III., t. 57.*

References.—*Beddome, For. Man., 222; Kurz., For. Fl. Burm., II., 440; Dalz. & Gibs., Bomb. Fl., 242; Gamble, Cat. Trees, Shrubs, &c., Darjeeling, 73; Trimen, Cat. Ceyl. Pl., 84; Lisboa, U. Pl. Bombay, p. 129; Bomb. Gaz., Kanara, XVI., Pt. I., 443.*

Vern.—*Goni*, KAN.; *Sunkong-kúng*, LEPCHA; *Búnuga*, SING.

Habitat.—A large umbrageous tree met with in the forests at the base of the Himálaya from Sikkim eastward; Khasia Hills, Burma, the Deccan Peninsula, and Ceylon.

TIMBER. 224

Structure of the Wood.—Enumerated among the timber trees of Bombay.

225

F. nemoralis, *Wall.; Fl. Br. Ind., V., 534.*

Syn.—F. GEMELLA and F. BINATA, *Wall.*; F. DENSA, F. TRILEPIS, and F. FIELDINGII, *Miq.*

References.—*Brandis, For. Fl., 424; Gamble, Man. Timb., 338.*

Habitat.—A moderate-sized tree of the outer Himálaya from the Hazára to Bhutan, ascending to 7,000 feet; Khasia Hills, Assam

FODDER. Leaves. 226 TIMBER. 227

Fodder.—The LEAVES are lopped for cattle fodder (*Gamble*).

Structure of the Wood.—White, moderately hard, close-grained. Weight 38lb per cubic foot.

F. nitida, *Thunb.* See **F. retusa,** *Linn.*

228

F. obtusifolia, *Roxb.; Fl. Br. Ind., V., 507; Wight, Ic., t. 662;* [*King, Fic., 42, t. 49, 83*[g].

Syn.—F. LONGIFOLIA, *Ham.*; UROSTIGMA OBTUSIFOLIUM, *Miq.*

Vern.—*Krapchi*, MICHI; *Date*, MAGH; *Nyaunggyat*, SHAN; *Nyoungkyap*, BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 641; Kurz, For. Fl. Burm., II., 443.*

Habitat.—A small-leaved, large epiphytic tree, of the tropical forests at the base of the Eastern Himálaya, from Sikkim to Manipur, Assam, Chittagong, Burma, and Perak.

GUM. 229

Gum.—Yields a rather good quality of caoutchouc (*Gamble, Man. Timbers*). Gives an India-rubber of inferior quality (*Gamble, List of Trees and Shrubs, &c., of Darjeeling*).

F. oppositifolia, *Willd.* See **F. hispida,** *Linn. fil.*

The Peepul Tree (Murray & Watt) | FICUS religiosa.

Ficus parasitica, *Kœn* See F. gibbosa, *Blume*

F. palmata, *Forsk*, *Fl Br Ind*, *V*, *530*, *Wight*, *Ic*, *t 649*, *King*, [*Fic 146*, *t 185* — 230

Syn — F CARICOIDES, *Roxb*; F VIRGATA, *Roxb*, *Wright*, *Brandis*,

Carica
It ... and Salt
Ra... o Nepal

MEDICINE. Fruits 231

hills Stewart says that at 5 000 feet he has found it excellent, though ... and is even export ... er The LEAVES

FOOD Fruit. 232

FODDER. Leaves 233

... uned, moderately ... Revenue Settle ... commonly used

TIMBER 234

F. pomifera, *Wall*, *Fl Br Ind*, *V*, *535*, *King*, *Fic*, *171*, *Pl*, *215* — 235

Syn — F HAMILTONIA *Wall* F OLIGODON *Miq*, F REGIA, *Miq*, *Kurz*
Vern — This seems to be the *Neverra* of Nepal

It seems probable that the bulk of the economic information published by popular writers under F. regia, *Miq*, should be relegated to this species, but according to King some of the botanical writers who deal with F regia refer to F. pomifera, others to F Roxburghii

F. religiosa, *Linn*, *Fl Br Ind*, *V*, *513*, *Wight*, *Ic*, *t 1967*, [*King*, *Fic*, *55 t 67A*, *84*", *Bedd*, *Fl Syl*, *t 314* — 236

The PEEPUL TREE

Syn — F AFFINIOR, *Griff* UROSTIGMA RELIGIOSUM, *Gaspar*, *Dalz & Gibs*, U AFFINE, *Miq*
Vern — *Pipal*, HIND; *Ashathwa*, *aswat*, *asud*, *asvattha*, BENG, *Hesar*

FICUS religiosa.

The Peepul Tree.

Gibs., Bomb. Fl., 241; Stewart, Pb. Pl., 213; Campbell, Report Econ. Prod., Chutia Nagpur, No. 7548; Cleghorn, 199; Mason, Burma and its People, 424, 776; Trimen, Cat. Pl. Ceylon, 83; Sir W. Jones, V., 159; Flora Andh., Elliot, 17, 162, 163; Ainslie, Mat. Ind., II., 25; O'Shaughnessy, Beng. Dispens., 577; U. C. Dutt, Mat. Med. Hind., 292; Dymock, Mat. Med. W. Ind., 2nded., 743; S. Arjun, Bomb. Drugs, 198; Murray, Pl. and Drugs, Sind, 31; Med. Top., Oude, 4; Baden Powell, Pb. Pr., 377; Atkinson, Him. Dist., 317, 737; Drury, U. Pl., 217; Lisboa, U. Pl. Bomb., 130, 204, 279, 283, 290, 291; McCann, Dyes and Tans, Beng., 50, 136, 144, 159, 165; Liotard, Dyes, 33; Liotard, Paper-making Mat., 31; Report on Indian Dyes, by Wardle, 24; Watson, Report by, 34, 43, 44, 61, 65; Balfour, Cyclop., I., 1101; Kew, Off. Guide to the Mus. of Ec. Bot., 122; Kew Off. Guide to Bot. Gardens and Arboretum, 29, 42; Journ. Agri. Hort. Soc., 1885, VII. (New Series), 263—276; Indian Forester, I., 273; III., 205, 236; V., 212; VI., 218, 240; VII., 277; X., 63, 325; XII., App. XXI., XXVIII.; XIII., 58, 69, 121; XIV., 391; Bomb. Gaz., II., 39, 355; III., 199; IV., 24; V., 28, 285; VI., 13, 183; VII., 37, 39, 40, 43; X., 39; XII., 26; XIII., 26; XV., Pt. I., 69; XVIII., Pt. I., 51; XX., 13; XXIII, 64; Panjáb Gazetteers: Sialkot, 11; Ludhiana, 10; Julundar, 5; Meerut, 33; Delhi, 18; Hoshiarpur, 10; Karnal, 16; Rawalpindi, 15; Jhang, 17; Montgomery, 18; N.-W. P. Gazetteers: Agra, IV., p. lxxvii.; Mozuffarghur, 22; Oudh Gaz., Vol. II., 345; Mysore and Coorg, Vol. I., 47, 70; III., 25; Manual, Trichinopoly Dist., 78; Man. Chindwara Dist., 110.

Habitat.—A large glabrous usually epiphytic tree, found wild in the sub-Himálayan forests in Bengal and Central India. Extensively cultivated in most provinces of India, though less frequently so in Burma.

GUM. 237

Gum.—The bark yields a tenacious milky juice which hardens into a substance resembling Caoutchouc.

"Its stem gives out a resinous gum which is used as sealing-wax, and is also employed by artificers to fill up the cavities of hollow ornaments" (*Gaz. Bomb., VII., 37*). This same curious fact is alluded to in the Ahmedabad Gazetteer (IV., 24). It is there stated that "The *piplo* (**Ficus religiosa**) and the *bordi* (**Zizyphus Jujuba**) yield a wax much used by goldsmiths for staining ivory red. It may here be pointed out, however, that these trees are the chief source of lac, and that the so-called gum mentioned above may be only the waxy excretion caused by the lac insect, and not a gum at all. The **Rev. A. Campbell** remarks that the milky sap is known among the Santals as *lóré*. Lac is abundantly produced on this tree; indeed, according to many writers, this is its chief use. A bird-lime is prepared from the milky juice, which is in the Deccan called *shelim*.

SPECIAL OPINIONS.—§ "Juice used as a bird-lime. One-fourth seer pipal juice, 2 chittacks linseed oil (castor oil will not do); simmer over fire for five minutes, let cool" (*W. Forsyth, Civil Medical Officer, Dinajpore; U. C. Mukerji, M.B., C.M., Civil Medical Officer, Dinajpore*).

DYE and TAN Bark. 238 Leaves. 239

Dye and Tan.—The BARK is said to be sometimes used in tanning. **Drury** mentions that the LEAVES are employed by the Arabs for this purpose. **Wardle**, however, says it contains little or no tannin, but yields to boiling water a reddish pale-brown colouring substance which by the employment of various processes gives to tasar, mulberry silk, and woollen fabrics, faint reddish fawn colours. The amount of colouring matter in the bark is small, but it might prove a convenient dye where faint shades are required or for modifying the colours produced by other dye-stuffs. **McCann** wrote that the bark of this tree is also mentioned as being used along with other barks when preparing a permanent black in Bengal. **Liotard** says the roots, on being boiled in water, produce with alum on cotton cloth a pale pink colour.

FIBRE. Bark. 240

one hour), loss 46 8, Cellulose, 41 2
may be pronounced worthless The
is very low, and the loss by weight due to alkali purification is ruinously high.

MEDICINE Bark 241 Root-bark 242 Fruit 243 Seeds. 244 Leaves. 245 Shoots. 246

Emerson)

SPECIAL OPINIONS —§ "Water in which the freshly burnt bark has been steeped is said to cure cases of obstinate hiccup" (*Civil Surgeon J. H. Thornton, B A, M B, Monghyr*) "Ashes of the growing shoots when well sifted are sprinkled on chronic unhealthy ulcers to bring them into a healthy condition' (*Surgeon-Major Bankabihari Gupta, M B, Pooree*) "In cracked foot the JUICE is employed, which is very sticky" (*Assistant Surgeon T. N Ghose, Meerut*) "The powder of the dried bark

Juice. 247

benefit, in t
like a blow-
into it, blew

FOOD AND FODDER. Leaves 248 Branches 249 Fruit. 250

this tree

SPECIAL OPINIONS —§ "The leaves are used as a vegetable by the Gonds" (*Narain Misser, Kathe Bazar Dispensary, Hoshangabad, Central Provinces*)

Structure of the Wood —Greyish white, moderately hard Weight

TIMBER. 251

Domestic and Sacred U
side tree, especially near ter
viewed as the female to the
ing to the *Valkhilya* the

DOMESTIC AND SACRED 252

FICUS retusa. | The Peepul Tree.

SACRED.

sanctum) is ordered. He further remarks that it is the transformation of the gods, *Guru*, and is termed *Ashwath*. It is specially worshipped on every Saturday of the month *Shrávan*, and on every *Somvati, i.e.*, on every Monday on which a new moon falls. The Hindu who plants a peepul tree does so expecting that just as he thereby affords shade to his fellow-creatures in this world, so after death he will not be scorched by excessive heat in his journey to the kingdom of Yama (*Oudh Gaz., III., 345*). There are five sacred trees among the Hindus, *viz., peepul, gulár, bargad, pákar,* and *mango*, but of these the first is by far the most reverenced. A good Hindu who on a journey sees a peepul tree will take off his shoes and walk five times round the tree from right to left (*pardachna*). While doing so he repeats the verse which may be translated "The roots are Brahma, the bark Vishnu, the branches the Mahadeos. In the bark lives the Ganges, the leaves are the minor deities. Hail to thee, king of trees" (*Elliott, Chronicles of Ornao*).

The peepul is "believed to be inhabited by the sacred triad, Brahma, Vishnu, and Shiv. It is used at the thread investiture and at the laying of the foundation of a building. Vows are made to it and it is worshipped; male offspring is entreated for under its shade, pious women moving round its trunk 108 times. So sacred is it that none will destroy it, even when it grows on the crevices of walls and buildings, pulling down the strongest masonry. Of its wood the spoons are made with which to pour clarified butter on the sacred fire" (*Bomb. Gaz., V., 37*).

253

Ficus retusa, *Linn.; Fl. Br. Ind., V., 511; Wight, Ic., t. 642; King,* [*Fic., 50, t. 61, 62, 84 F.*

Syn.—F. DILATATA, *Miq.*; F. NITIDA, *Thumb.*; *Wight, Ic.*; F. RUBRA, *Roth.*; F. LITTORALIS, *Blume*; F. MICROCARPA, *Linn.*; F. BENJAMINA, *Willd.*; *Roxb., Fl. Ind.*; UROSTIGMA RETUSUM, NITIDUM, MICROCARPUM, and OVOIDEUM, *Miq.*

Vern.—*Kamrup, zir,* BENG.; *Butisa,* KOL.; *Sunumjon,* SANTAL; *Jili,* CHUTIA NAGPUR; *Jamu,* NEPAL; *Sitnyok,* LEPCHA; *Jili,* MAL (S.P.); *Nandruk,* MAR.; *Yerrajuvi, nandiréka,* TEL.; *Pilála, pinval,* KAN.; *Nyaungok, nyoungthabyeh,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 643; Brandis, For. Fl., 417; Kurz, For. Fl. Burm., II., 444; Beddome, For. Man., 223; Gamble, Man. Timb., 336; List, Trees and Shrubs, &c., of Darjeeling, 75; Dalz. & Gibs., Bomb. Fl., 241, 242; Trimen, Cat. Ceyl. Pl., 84; Elliot, Fl. Andh., 27, 68; Dymock, Mat. Med. W. Ind., 2nd Ed., 745; Lisboa, U. Pl. Bomb., 130; Balfour, Cyclop., I., 1101; For. Ad. Report, Ch. Nagpore, 1885, 33; Bomb. Gaz.: XIII., 26; XV., Pt. I., 69; XVI., 16; Indian Forester: III., 205; VIII., 332; IX., 516.*

Habitat.—A large evergreen tree, having a few aerial roots: met with at the base of the Eastern Himálaya from Kumaon to Bengal, Assam, South India the Deccan Peninsula, Burma, and the Andaman Islands. Distributed to the Malay Islands, China, and New Caledonia.

The *Flora* describes two varieties of this species:—

254 — α F. retusa, *Linn.*—The *Nandruk* of the Deccan Peninsula.

255 — β F. nitida, *Thunb.*—The tree of the trans-Gangetic regions.

MEDICINE. Root-bark. 256 — Root 257 — Leaves. 258

Medicine.—The bark of the ROOT, the root itself, and the LEAVES boiled in oil form good applications for wounds and bruises (*Rheede*). In rheumatic headaches the leaves and bark pounded are applied as a poultice. In flatulent colic the leaf-juice is used, mixed with that of *tulsí*, and *ghí* (equal parts), applied externally and accompanied by fomentation with a hot brick (*Dymock; Rheede*). The juice of the bark in doses of one tola in milk has a reputation in liver disease.

TIMBER. 259

Structure of the Wood.—Light reddish-grey, close-grained, moderately hard, beautifully mottled. Weight 40lb per cubic foot. It is used

for fuel, but as it is very prettily grained it might be found valuable for tables, door panels, and other purposes A valuable avenue tree, as it affords dense shade

[King Fic, 168, t 211

260

Ficus Roxburghii, *Wall*, *Fl Br Ind*, V, 534, *Wight Ic*, t 673,

Syn —F MACROPHYLLA, *Roxb*, F SELEROPTERA, *Griff* F REGIA, *Miq*, CERELLIA MACROPHYLLA, *Miq*

Vern —*Trimmal, timal, timla* HIND, *Demur, doomoor*, BENG, *Sapai* MAGH, *Kotang*, KOL, *Kasrekan* NEPAL, *Kundoung*, LEPCHA, *Urbul, urmul, barbaru tusi, trimbal trimal, tirnal dadúri tremal, tirmi tiamb, timbal, burh*, PB, *Ber* (fruit = *hurmal*) (HAZARA), PUSHTU; *Sin tha hpan* BURM

Hoshiarpur, II

Habitat.—A moderate-sized tree of the outer Himalaya from the Indus ... hitta-

FIBRE. 261

... ed as handsome, of a russet red colour, and of the shape and size of a Dutch tur- ... especially near ... specimen which ... t 1 cwt of figs ... rdener's Chroni- *cle*) ... sant fl... larly b ... Str ... t 34lb

FOOD. Fruit. 262

Leaves. 263

TIMBER. 264

[*Ficus*, p 54, t 67B, 84', *Brandis* t 48

265

F. Rumphii, *Bl*, *Fl Br Ind*, V, 512, *Wight*, *Ic*, 640, *King*,

Syn —FICUS CORDIFOLIA, *Roxb* (*non Bl*) UROSTIGMA RUMPHII, *Miq*, U CORDIFOLIUM, *Miq* FICUS, *Sp*, *Griffith, Icon Pl As*, t 549

Ahmadnagar, XVII, 20

thus being less suited for avenue and road-side planting than **F. retusa**, which is spoken of as the best of the road-side trees. In Oudh it seems to be specially associated with the *Sál* (**Shorea robusta**). The fruits ripen in May to June.

GUM. 266 — **Gum.**—Roxburgh remarks that the milky juice flows abundantly from fresh wounds, and is very tenacious.

RESIN. 267 — *Resin.*—The lac insect is reared extensively on **F. Rumphii** in Assam. This tree is specially cultivated for that purpose, and is remarkable on account of the insect not destroying it, though crops are taken annually.

FIBRE. Bark. 268 — **Fibre.**—According to the Rev. A. Campbell the BARK yields a cordage fibre of good quality.

MEDICINE. Fruit. 269 Juice. 270 — **Medicine.**—The Santals use the FRUIT as a drug. **Dymock** writes of this species: "The JUICE is used in the Concan to kill worms and is given internally with turmeric, pepper and *ghí*, in pills, the size of a pea, for the relief of asthma; it causes vomiting. The juice is also burned in a closed vessel, with the flowers of *umdar*, and 4 *gunjás* weight of the ashes mixed with honey, is given for the same purpose."

FOOD. Fruit. 271 Leaves. 272 FODDER. Branches. 273 — **Food and Fodder.**—The FRUIT is eaten by the natives. The LEAVES and BRANCHES are used for cattle fodder.

TIMBER. 274 — **Structure of the Wood.**—Very soft, spongy. Weight 27lb per cubic foot. The wood is used in Cachar to make charcoal, and is also employed in tea manufacture and as fuel.

DOMESTIC AND SACRED. 275 — **Domestic and Sacred.**—The leaves are used in *panch-pallavs*.

276

Ficus Tsiela, *Roxb.; Fl. Br. Ind., V., 515; Wight, Ic., t. 668; King,* [*Fic., 59, t. 74, 84*[2].

Syn.—F. AMPLISSIMA, *Smith*; F. INDICA, VAR., *Linn.*; F. BENJAMINA, *Wall.*; UROSTIGMA PSEUDO-TJELA, and PSEUDO-BENJAMINA and TJIELA, *Miq.*

Vern.—*Jari*, HIND.; *Pimpri*, BOMB.; *Juvvi, ichchi*, TAM.; *Juvvi* (? *jovi*), TEL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 642; Beddome, For. Man., 314; Thwaites, En. Ceylon Pl., 265; Dals. & Gibs., Bomb. Fl., 241; Cleghorn, 196, 199; Elliot, Fl. Andh., 75; Lisboa, U. Pl. Bomb., 130; Indian Forester: III., 205; XII., App. 21; Mans.: Coimbatore Dist., 39; Cuddapah, 263; Bombay Gazetteer, Vol. XVII., 26.*

Habitat.—A large spreading tree without aerial roots, met with in the Deccan Peninsula from the Concan southward. Roxburgh regards it as next to **F. religiosa**, the largest species of Indian fig. It is a handsome tree, with smooth bark, wholly glabrous, and is met with in cultivation along roads throughout India.

FIBRE. Bark. 277 — **Fibre.**—The BARK gives a good fibre.

TIMBER. 278 — **Structure of the Wood.**—No author seems to have specially described this, but it is used as firewood.

F. virgata, *Roxb.*; see **F. palmata**, *Forsk.*

Filberts, see **Corylus Colurna**, *Vol. II., p. 575, No. 1988.*

FILICIUM, *Thw.; Gen. Pl., I., 325.*

279

Filicium decipiens, *Thwaites; Fl. Br. Ind., I., 539;* BURSERACEÆ.

Vern.—*Katu puveras*, TAM.; *Pehimbia*, SING.

Habitat.—A tree with elegant fern-like leaves, found in the Western Ghâts up to 4,500 feet, also in Ceylon.

TIMBER. 280 — **Structure of the Wood.**—Heartwood red, moderately hard. Pores small, in groups or short radial lines. Medullary rays fine, numerous, at unequal distances. Weight 68lb per cubic foot.

The wood is strong and valuable for building (*Gamble, Man. Timb., 68*).

The Fishes of India. (J Murray) FISH.

Filix-mas, see Nephrodium Filix-mas, *Richard*, FELICES

FIMBRISTYLIS, *Vahl*, *Gen Pl*, *III*, *1048*, CYPERACEÆ — 281

The species of sedges referred to this genus do not appear to be of much economic value. F Kysoor in *Dalz & Gibs*, *Bomb Fl*, *p 288* (Scirpus Kysoor, *Roxb*, *Fl Ind Ed C B C*, *77*) is said to be eaten in times of famine (*Lisboa*, *U Pl Bomb*, *208*). It is the *Kysur* or *Kesuri* of Bengal. This should not be confused with *kesuria*—Eclipta alba

Fimbristylis junciformis, *Kunth*, is the *Bindi muthi* of the Santals, the roots of which, according to the Rev A Campbell, are given in dysentery. — 282

F. monostachya, *Hassk*, is known to the Santals as *Nanha bindi mutha* — 283

Fir, see Abies and Pinus, CONIFERÆ

(J Murray)

FISH, *Day*, *Fishes*, *in Fauna of British India* — 284

For the purposes of a description, such as the following, the Fish of India may be divided into two great classes—THE MARINE and the FRESH WATER—both of which are not only very large, but owing to their forming an extremely important source of the animal food of the Natives of this country, are well worthy of careful attention. The question of the best means of protecting and stimulating the large fishing industries of India has always attracted much attention, and the natural history of the subject has been the object of careful and laborious research on the part of many learned zoologists. Of all the provinces of India a Fisheries Act exists in Burma alone, but the question of framing an Act to embrace all the provinces is at present under the consideration of Government

References —*Day*, *Fishes of India*, *Fresh water Fishes of India and* [illegible]

[illegible] *of Bengal*, *Central Provinces*, *Madras*, *Bombay*, *North-West Provinces*, *Panjáb*, *in many passages*

DISTRIBUTION.

FOOD. 285

FISH.

Fishing Classes and Fisheries.

FISH-EATING CLASSES.

by the people of the country. In considering this question it is, therefore, necessary to observe first of all what proportion of the people of India and Burma can consume fish as food without infringing religious prejudices. In the Panjáb and North-Western Provinces comparatively few of the inhabitants are thus prohibited; the large Muhammadan population eat fish, except those without scales and fins (such as the eel), while the Hindus, with the exception of certain Brahmans, Thakurs, Baniyas and Bhagats, consume fish of all kinds. Similarly, in Hyderabad, Mysore, and Coorg, more than half the population are permitted by their religion to consume fish; in Oudh the majority can do so; and in Sind nearly all except the Brahmans. Varying statements are made regarding Bombay in the District Gazetteers, from three-fourths in Khandesh, to 25 per cent in Bijapur, but the former figure probably represents more nearly the actual average; only Brahmans, high-caste Súdras, Márwár Vanís, Lengáyats, Jains, and a few others being prevented by their castes from eating fish. In Madras about a similar percentage; in Bengal proper from 90 to 95 per cent.; in Assam and Chittagong almost the entire population are permitted to eat fish; while in Burma the use of fish diet is universal, notwithstanding that the Burmans as Buddhists profess the greatest horror at taking the lives of the lower animals They console their consciences, however, with the idea that the sin lies entirely with the fishermen, and in Burman temples are depicted vivid representations of the terrible tortures the latter will have to endure in a future existence.

Notwithstanding the enormous market for fish, and the teeming waters in and around India, the supply appears to be everywhere insufficient to meet the demand, while the fishing classes are wretchedly poor. Dr. Day, in commenting on this fact, writes: "Investigating how the local markets were supplied with fish up to 1873, the replies from native officials gave the following results. In the Panjáb one in ten markets was sufficiently supplied, in the North-West Provinces one in three, in Oudh one in four. In Bombay the amount was stated to be insufficient in all, and similar reports came from Hyderabad, Mysore, and Coorg. In Madras near the sea the quantity was sufficient, but inland it was only so in one out of ten." In a further passage he writes: "The most casual observer cannot fail to perceive how numerous are the varieties, and vast the number of the finny tribes in the seas of India, but from some cause,—whether due to legislative enactments and local obstructions, or native apathy and impecuniosity,—the harvest has, up to within the last few years, been comparatively untouched, an enormous amount of food still remains uncaptured, while famines are devastating the contiguous shores."

FISHING CLASSES. 286

Fishing Classes and Fisheries.—The MARINE FISHING CLASSES of India present many features of great interest, showing, as they do, survivals of manners and customs dating from very remote times. According to ancient Hindu legislation they belonged to the Súdra or servile caste. In most places they still maintain that they were, of old, divided into two distinct classes: (1) those who captured fish in the deep sea, (2) those who pursued their avocation from the shore, fishing in back-waters and creeks. Nowadays, however, owing to the depressed condition of the fishing industry, the deep sea fishermen (except where salt is cheap or a good local market exists) have taken to the less expensive occupation of plying their work inshore, and earn part of their living by work of other sorts. In Sind the fishermen are Muhammadans and are termed Mohanís. They are probably partly immigrants from Arabia, and partly Hindus converted to Islam. In Bombay they are chiefly Machhís, Márátha Bhoís, Káche Bhoís, Menjage Bhoís, Bagdi Bhoís, and Kolís, but many other classes occasionally fish. In the Madras Presidency they have

FISHING CLASSES.

customs of a patriarchal nature, which are, however, more strictly observed on the Coromandel than on the Western coast. The present organization in those parts is probably the remains of a very ancient system, as it is difficult on any other supposition to account for the immense hereditary power held by certain individuals Not only have they hereditary and elective headmen of villages, but also hereditary priestly chiefs, who are the final referees in all family and caste disputes Regarding these fishing tribes Dr. Day writes: "The condition of the sea-fishermen in Sind about ten years ago when investigations were made, showed that they were fairly well off, miserably poor in Bombay except in the vicinity of large towns, in a prosperous condition from South Cánara down the western coast of the Madras Presidency, but once round Cape Comorin they again appeared as a poverty-stricken race of people, and continued so up the Coromandel coast, except when residing near large centres of population"

The FISHERMEN OF FRESH WATERS are, as a rule, members of fish-eating castes, who engage in fishing as an occasional and subsidiary occupation, only a very few of the original fishing castes still restricting their means of livelihood to their hereditary industry Under native rule in India this was not so; fishing having then been in the hands of distinct castes, but as British rule has given up taxes on the industry, and of recent years fishing rents as well, it is now no one's interest to prevent undue depletion of the fisheries, and as a consequence fishing is no longer generally remunerative.

SALT-WATER. 287

Classification of Fisheries—SALT-WATER.—Many and various methods of fishing are employed along the coasts of India and Burma, of which it is impossible, within the scope of the present article, to give a complete account The chief characteristics of the systems may, however, be ... ipiled from Dr Day's ... *1st Tidal Fisheries* ... ish are carried by the ... ebb. They are then removed by scoop, lave, cast or other nets, or screens may be constructed of stonework, bamboo, rattan, or reed, to allow of the escape of the water ...

obtaining a supply of fish on certain parts of the Indian coast. The ...

Moveable Nets—Are of many forms—purse-nets used in shallows, cast-nets, drag-nets, and special nets for particular purposes varying in size, shape, and diameter of mesh according to the fish they are intended to capture *4th, Wicker Traps*—Are very extensively employed in all parts of the East They may be cone- or bell- shaped with both ends open, in which case they are employed in shallows, the fisherman placing the larger end ... 'ler, or they may be built ... eways. *5th, Miscellane-* ... arrows, and fishing with ... all employed in various parts of the country. *6th, Deep sea Netting*—Is, as already stated, carried on to a very limited extent only, not only because of the insufficiency of a remunerative market, but also because the necessary appliances, boat, net,

FISH.

Classification of Fisheries.

FISHERIES.

&c., are expensive, and the fisher class is a miserably poor one. For instance, Dr. Day informs us that in Sind, a boat costs about £100, and a net suitable for deep-sea fishing involves an outlay of from £40 to £50. The purchase of such an expensive plant, therefore, necessitates the borrowing of the money, on which the fisherman has to pay an exorbitant interest, leaving but a poor margin of profit as the reward of his labour.

FRESH-WATER, 289

FRESH-WATER.—With the establishment of British rule the fishing on rivers, which at one time was restricted either by the imposition of taxes or by leasing out to contractors the monopoly of fishing, has become, in most parts of the country, free and unrestricted. The natural result has been that every fish consumer is at liberty to capture his own fish, and the old fresh-water industry has necessarily declined. But an evil outcome of this has been that every endeavour is now made to catch as many fish, of all sorts and sizes, as quickly and cheaply as possible, and for this purpose all kinds of appliances are used. Rivers are dragged with nets having infinitesimally small meshes, or with coarse cloths; or a similar apparatus is even placed across a stream from bank to bank, and another dragged down stream to it, thus clearing every living thing out of the tract netted. At the same time the agricultural classes catch fish for themselves by means of wicker traps, baskets, and nets. Neither breeding fish nor fry are respected, everything caught is killed and eaten or destroyed, and no close season anywhere exists; hence as a natural result the supply of fish is everywhere diminishing. This is especially so in the case of the finer migratory hill fishes, such as the *mahasír*. Owing to the immense number of wicker-work and net weirs now to be found in most mountain streams at every few miles, the water is literally strained, with the inevitable consequence that the fish are rapidly decreasing in the lower reaches. In some places, more especially in the Doon hill tracts, streams are also frequently diverted in part of their course by damming them up, the large fish are extracted from the pools in the old bed of the river, and the fry are left to die as the water dries up. Not only are these and many other of the poaching practices so strongly condemned in England carried on day after day, but poisoning the water is also frequently resorted to as a means of ready and wholesale destruction. The principal plants employed for this purpose are:—**Strychnos Nux-vomica, Lasiosiphon speciosus, Balanitis** ***Roxburghii, Tephrosea suberosa,*** **Euphorbia Tirucalli, Hydocarpus Wightiana, H. venenata.** Of recent years, also, a still more powerful agent of destruction has been found in dynamite, to the use of which natives employed in mines, and on tea, coffee, and cinchona estates have become habituated. They find no difficulty in possessing themselves of their employers' cartridges on off-days, and employ them freely, with the result that the place dynamited is denuded of all fish life, full grown, fry and ova. Besides these methods of directly killing fish, there are many other artificial agencies which indirectly, but to a very great degree, affect fisheries in many districts. Perhaps the most important of these is the large irrigation works now existing in many parts of the country, formed by diverting a large amount of the water of a river down a canal. Where these canals are not constructed for navigation as well as irrigation, falls frequently exist, down which the fish can pass, but cannot return. The canal is thus converted into a vast fish trap, wherein all the fish are destroyed when run dry to examine it for necessary repairs. In the same way the small tributary irrigation canals act as traps from the main channel, all the fish entering them being invariably killed. The yearly inundations attendant on the rains, and the annual drying up of many tanks, must also be fertile sources of mortality. Dr. Day, in summing up the consideration of this subject in his admirable report,

Contrivances. 290

Poisons. 291

Explosives. 292

FISHERIES.

writes: "Thus it has come to pass that among the animal productions of India, fresh-water fish meet with the least sympathy, and the greatest persecution, many forms having to struggle for bare existence, in rivers which periodically diminish to small streams, or even become a mere succession of pools, or in tanks from which the water totally disappears. They have their enemies in the egg stage, in their youth, and during their maturity, but among these man is their greatest foe, as any one who desires a fish diet captures these creatures, whenever and wherever he gets the chance, irrespective of season, age, and size In certain districts they simply appear to exist solely because man and vermin have been unable to destroy them."

Many suggestions have at different times been made to remedy this wholesale and indiscriminate destruction, by such means as preventing poisoning, regulating the size of net mesh, guarding the mouths of irrigation canals against the entrance of fish, levying taxes on the use of fishing implements, &c As above stated these are at present under the consideration of Government, with a view to the introduction of a Fisheries Bill

Rent. 293

Rent of Fisheries.—The available amount of information regarding

percentage rent to have been ·17 on the value of the property farmed. The revenue derived from Sind Fresh-water Fisheries in 1882-83 was R92,541, and from Burma in 1883, 12 to 13 lakhs of rupees—a not uninteresting evidence in favour of a Fisheries Act for the other provinces of India.

SALT FISH.

Egg-pl. 296

TRADE. 297

FISH. **Industrial Products from Fish.**

TRADE IN CURED FISH.

the five years ending 1887-88 the total average imports were 12,088,846lb, valued at R10,82,836, In comparison with the five years ending 1882-83, this shews a considerable increase, the average for that period having been 8,921,583lb, value R7,85,557. Not only is there an increase in imports but a larger proportion of the fish thus obtained is consumed in the country, the re-exports shewing a decrease from an average of 444,447lb in the five years ending 1882-83 to 176,361lb in the later period. The countries which form the chief sources of supply are Mekran and Sonmiani, the Straits Settlements, Arabia, Persia, Ceylon, and Turkey in Asia. The exports appear to have remained very steady during the past ten years, though fluctuating considerably year by year. Thus in the latter half of that period the total average quantity was 4,096,074lb, value R3,55,756, while in the former it was 3,393,634lb, value R1,82,857. The port from which much the largest proportion was exported last year was Madras, which shipped 4,560,858 out of a total of 4,870,944lb, while Ceylon formed the principal market, importing 4,384,034lb of the whole. It would be interesting to know to what extent the enlightened efforts to supply cheap salt had influenced the formation of the large Madras export trade as compared to any other province.

FISH OIL. 298

Fish Oil.—The manufacture of oil from fish is carried on all along the Western coast of India and also in other parts. It is obtained chiefly from the livers of sharks, skates, saw-fishes, cat-fishes, oil sardines, and other kinds, also from the heads, intestines, and even the whole body of some species. The process of manufacture as carried out in India is very crude; the livers are not washed, but fresh or putrid, clean or foul, they are put into a pot and heated up to boiling point, when the oil separates, floats on the top, and is skimmed off. It undergoes no straining and is consequently impure, and frequently rancid. At Rangoon a large amount is manufactured, the average quantity being said to exceed 77 tons a month. The ordinary oil thus obtained is employed for the purposes of cooking, lighting, and in tanning leather, while that extracted from the livers of species of Carcharias or shark is said to be an efficient substitute in medicine for cod-liver oil. Fish oil is a commercial article of considerable importance, large quantities being exported to Europe. In the official trade returns, however, no separate statistics exist, so that definite information as to its extent cannot be furnished.

FISH ROES. 299

Fish Roes—Obtained from several species, are largely employed as an article of food in many parts of India, and are sold in nearly every bazár of South and East Asia.

FISH SKIN. 300

Fish Skin.—The rough skins of species of Sharks, Skates, and Rays are employed for polishing in several parts of the country. Shagreen or shark's skin is chiefly used to cover scabbards.

FISH MAWS. 301

Fish Maws—Along with sharks' fins form an important article of foreign trade. See SHARKS' FINS, FISH MAWS, &c., in another volume.

FISH SCALES. 302

Fish Scales.—The scales of the Mahasir (**Barbus tor**) are employed in the manufacture of playing-cards. The scales are cut in a circular form about 1½ inch in diameter, and painted as required The principal seat of their manufacture is at Shahabad in Bengal.

MEDICINE. 303

Medicine.—Generally speaking, fish diet is considered by Hindu writers to be less heating than animal flesh, less likely to excite an inordinate flow of bile, more easily digested, and to be particularly indicated in cases of diabetes. Certain forms of dried fish are also held to be powerfully aphrodisiac, and in Patna, Dr. Irvine informs us, a concretion from the head of a fish called "*Sung-sir-mahi*" is supposed to have the same property. The oil of the liver of the **Gadus morrhua**, or common Cod, has well-known properties as a nutritive tonic and alterative, and, as already mentioned, it

appears that the oil derived from the liver of species of Carcharias possesses similar valuable properties The bile of certain species has fanciful properties ascribed to it by Natives in many localities, such as that of

AGRICULTURAL USES. 304

SACRED USES 305

chief economic value as sources of food, oil, isinglass, or shagreen. When common to all the species of a genus, the economic properties will be found described in the remarks under the first Subsequent to the receipt of first proof the writer obtained, however, the *Fauna of British India*—FISHES—to which he has consequently been able to give references only

306

Archipelago and beyond.
Eaten raw and salted, the livers are also employed to produce oil, and the fins are exported to China with those of other rays, skates, and sharks

307

Habitat.—From the Kistna, and Orissa, throughout the Indus, Jumna, and Ganges, after they leave the hills to their termination, also the rivers of Assam
This fish is excellent eating

308

Ambassis baculis, *Day, Fish Ind, 51, Fau Br. Ind, I, 485*
Vern —*Kung gi*, PB, *Nga kóun mah, nga sin sat*, BURM
Habitat.—Fresh waters of Bengal, Orissa, and as far north as the

309

A. commersoni; *Day, Fish. Ind, 52, Fau Br Ind, I, 488*
Vern —*Selintan* MADRAS
Habitat —Seas of India, ascending rivers and estuaries

310

A. gymnocephalus, *Day, Fish Ind, 54. Fau Br. Ind, I, 489*
Vern —*Chandi*, URIYA
Habitat.—Seas of India

311

A nama, *Day, Fish Ind, 50, Fau Br Ind, I, 484*
Vern —*Cart kano, goa-châppi*, URIYA, *Son dah*, ASSAM, *Buck ra, pom pi ah*, N W P, *Muckni, ched-du ah*, PB, *Pud-du, put to lak*, SIND, *Ak-ku-rati*, TEL
Habitat.—Throughout the fresh waters of India, Assam, and Burma

312

A. ... *handt*, N W P,

313

Amblypharyngodon atkinsonii, *Day, Fish Ind, 555. Fau Br Ind, I, 290*
Vern —*Nga pan-ma*, BURM

Habitat.—Rivers throughout Burma. The species of this genus though bony, where abundant, enter largely into the diet of the Natives.

314

Amblypharyngdon melettina; *Day, Fish. Ind.*, *555*; *Fau. Br. Ind.*, *I.*, *292.*
Vern.—*Kali-korafi*, HIND.; *Ulari*, TAM.; *Wumbú*, MALAY.; *Paraga*, KAN.
Habitat.—The fresh waters of the Malabar coast, and Southern India from the Nilghiris to Madras, also Ceylon (Bombay, according to Cuv. and Val).

315

A. mola; *Day, Fish. Ind.*, *555*; *Fau. Br. Ind.*, *I.*, *291.*
Vern.—*Kavdi*, BENG.; *Morara, patia kerundi*, URIYA; *Moah*, ASSAM; *Mukni*, PB.; *Talla-maya*, TEL.; *Nga-beh-byú, nga-zen-zap*, BURM.
Habitat.—Ponds and fresh-water rivers from Sind, throughout India (except the Malabar coast), Assam, and Burma.

316

Amphipnous cuchia; *Day, Fish. Ind.*, *656*; *Fau. Br. Ind.*, *I.*, *69.*
EEL, *Eng.*
Vern.—*Cuchia*, BENG., URIYA; *Dondu-paum*, MADRAS; *Nga-shin*, BURM.
Habitat.—The fresh and brackish waters of the Panjáb, extending to Bengal, Orissa, Assam, and Burma.
Natives reject this as food, and imagine that its bite is fatal to cattle.

317

Anabas scandens; *Day, Fish. Ind.*, *370*; *Fau. Br. Ind.*, *II.*, *367.*
CLIMBING FISH, *Eng.*
Vern.—*Coi*, BENG.; *Coi, cown*, URIYA; *Coi*, ASSAM; *Sennal, pauni-eyri*, TAM.; *Undi-colli*, MALAY; *Kavaya*, or *kawhy-ya*, SING.; *Nga-pri*, MUGH; *Nga-byays-ma*, BURM.; *Harúan*, MALAYS.
Habitat.—Estuaries and fresh waters of India, Ceylon, and Burma.
This fish is most remarkable for its powers of living in the air, and can travel a long distance on land. The boatmen of the Ganges carry them in moist earthen pots, killing and cooking them as required. They are highly esteemed as a nourishing food.

318

Apocryptes bato; *Day, Fish. Ind.*, *302*; *Fau. Br. Ind.*, *II*, *278.*
Vern.—*Rutta*, URIYA.
Habitat.—Rivers of Orissa and Lower Bengal, within tidal reach.

319

A. lanceolatus; *Day, Fish. Ind.*, *301*; *Fau. Br. Ind.*, *II.*, *277.*
Vern.—*Changua*, BENG.; *Pitallu*, URIYA; *Nullah-ramah*, TEL.
Habitat.—Seas of India.

320

Arius burmanicus; *Day, Fish. Ind.*, *458*; *Fau. Br. Ind.*, *I*, *173.*
Vern.—*Nga-young*, BURM.
Habitat.—Tidal rivers of Burma. The several species are employed as food, though of an inferior quality. On the Western coast they are largely salted, and a considerable amount of isinglass is prepared by drying their air-vessels.

321

A. gagora; *Day, Fish. Ind.*, *465*; *Fau. Br. Ind.*, *I.*, *185.*
Vern.—*Gagora*, BENG.; *Nga-youn, nga-yeh*, BURM.
Habitat.—Seas, estuaries, and tidal rivers of Orissa and Bengal, to Siam.

322

A. jatius; *Day, Fish. Ind.*, *466* *Fau. Br. Ind. I.*, *186.*
Vern.—*Jat-gagora*, BENG.; *Nga-youn, nga-yeh*, BURM.
Habitat.—Estuaries and rivers of Bengal and Burma, ascending far above tidal reach.

323

A. macronotacanthus; *Day, Fish. Ind.*, *465*; *Fau. Br. Ind. I.*, *184.*
Vern.—*Ikau-saludu*, MALAYS.
Habitat.—Rivers of India.

Arius sagor; *Day, Fish Ind, 461. Fau. Br Ind, I, 178* — 324

Vern.—*Sagor*, BENG

Habitat.—From Bombay, through the seas and estuaries of India, very common at Batavia, where it is largely consumed

A. thalassinus; *Day, Fish. Ind, 463. Fau. Br. Ind, I, 181.* — 325

Vern.—*Cuntea*, URIYA, *Deddi jella*, VIZAGAPATAM

Habitat.—From the Red Sea, through those of Africa and India, entering tidal rivers

Aspidoparia [illegible] — 326

Vern —

Chulc

SIND

Habitat.—

and localities south of the Kistna river.

Eaten by the Natives of many districts

Atherina forskalii; *Day, Fish. Ind, 345. Fau. Br. Ind., II, 338.* — 327

WHITEBAIT of Europeans in Malabar

Vern —*Ko-re-dah*, ANDAMANS

Habitat —Seas of India

"It only reaches to a few inches in length, and is most commonly captured during the cold season It is one of several genera, certain species of which are indiscriminately termed 'whitebait' by Europeans, and are dressed for the breakfast table" (*Day*).

Bad [illegible] — 328

[illegible]

Bagarius yarrellii; *Day, Fish Ind, 495. Fau Br Ind, I, 194* — 329

FRESH WATER SHARK, *Eng*

Vern —*Bünch, gunch*, HIND, *Baag-aari* BENG, *Sah-lun, cart cuntea*, URIYA, *Goreah*, ASSAM, *Rahti-jellah*, TEL, *Guwch, khird, mûlandah*, MAR

Habitat —Large rivers of India and Java, descending to the estuaries

[illegible]

are forbidden to Muhammadans, and partly because they are very foul feeders.

Bar[illegible] — 330

spe[illegible]

gen[illegible]

app[illegible]

employed as food.

B. amphibius; *Day, Fish Ind, 574; Fau. Br Ind, I, 322.* — 331

Vern —*Uli perli*, MALAY

Habitat —A fish, generally attaining the length of 6 inches, of the rivers of Central India, Deccan, Bombay, the Western coast of India, Madras, and up the coast as high as Orissa.

B. apogon; *Day, Fish Ind, 575, Fau. Br Ind, I, 324* — 332

Vern —*Nga ta zee, nga lay-toun*, BURM

Habitat.—The rivers of Tenasserim and throughout Burma (certainly as high as Mandalay) to the Malay Archipelago.

333 **Barbus carnaticus**; *Day, Fish. Ind., 563; Fau. Br. Ind., I., 304.*

Vern.—*Giddi-kaoli*, HIND.; *Poari candi, saal candi, shelli*, TAM.; *Gid-pakke*, KAN.

Habitat.—Rivers along the bases of the Nilghiris, Wynaad, and South Cánara Hills. This is a large species, attaining the weight of at least 25lb.

334 **B. chagunio**; *Day, Fish. Ind., 559; Fau. Br. Ind., I., 299.*

Vern.—*Chaguni, jerruah*, BENG.; *Chaguni*, BEHAR; *Púti-keintah*, ASSAM.

Habitat.—The rivers of Bengal, Orissa, Behar, North-Western Provinces, Panjáb, and Assam.

A medium-sized fish, attaining the length of at least 18 inches.

335 **B. chola**; *Day, Fish. Ind., 571; Fau. Br. Ind., I., 317.*

THE BITTER CARP.

Vern.—*Katcha karawa*, HIND.; *Karrundi, chola*, BENG.; *Pittha-kerrundi*, URIYA; *Korún*, TAM.; *Chuddu paddaka*, TEL.; *Nga-khonma, nga-lowah*, BURM.

Habitat.—The rivers of Bengal, Orissa, the Gangetic Provinces, the Panjáb, the Central Provinces, Madras, Malabar, and Wynaad, also Akyab and Burma to Mergui.

Food. 336 As food, this fish is bitter; in some localities in Burma oil is obtained from it, during the breeding season.

337 **B. chrysopoma**; *Day, Fish. Ind., 561; Fau. Br. Ind., I., 301.*

Vern.—*Mundutti*, MALABAR.

Habitat.—Fresh waters along the coast of India, from Kutch to Bengal.

338 **B. conchonius**; *Day, Fish. Ind., 576; Fau. Br. Ind., I., 325.*

Vern.—*Kunchon pungti*, BENG.

Habitat.—The rivers of Assam, Lower Bengal, Orissa, Behar, the North-Western Provinces, the Panjáb, and the Deccan.

339 **B. cosuatis**; *Day, Fish. Ind., 581; Fau. Br. Ind., I., 332.*

Vern.—*Koswati*, BENG.; *Pangut*, MAR.

Habitat.—The rivers of Bengal, North-Western Provinces, Deccan, Bombay, and down the Western coast as low as Cottayam in Travancore.

340 **B. filamentosus**; *Day, Fish. Ind., 582; Fau. Br. Ind., I., 333.*

THE RED-TAILED CARP.

Vern.—*Sawaal-candi, chevalle*, TAM.; *Curroah*, MALAY.

Habitat.—Western coast and Southern India. A very curious change occurs in this fish immediately after death, the whole body becoming scarlet.

341 **B. gelius**; *Day, Fish. Ind., 577; Fau. Br. Ind., I., 327.*

Vern.—*Gili, pungti*, BENG.; *Cutturpoh*, URIYA.

Habitat.—The rivers of Ganjam, Orissa, Bengal, and Assam.

342 **B. guganio**; *Day, Fish. Ind., 579; Fau. Br. Ind., I., 328.*

Vern.—*Gugani*, BENG.; *Nga-hkon-mahgyi, nga-chong*, BURM.

Habitat.—The Gangetic Provinces and Assam.

343 **B. hexastichus**; *Day, Fish. Ind., 565; Fau. Br. Ind., I., 308.*

Vern.—*Parrah-perli*, MALAY.; *Lobura*, ASSAM.

Habitat.—A large fish, attaining 3 feet in length, of the rivers in and around the Himálaya, Kashmír, Sikkim, and Assam.

344 **B. kolus**; *Day, Fish. Ind., 573; Fau. Br. Ind., I., 319.*

Vern.—*Nilusu*, TEL.

Habitat.—The Central Provinces, and the Deccan, throughout the Kistna, Tambúdra, and Godaveri rivers.

of Economic Value (*J Murray*)	FISH
Barbus micropogon, *Day, Fish Ind*, 563. *Fau Br Ind*, *I*, 304 Vern —*Coati candi*, TAM Habitat —The rivers around the base of the Nilghiris, Wynaad, and South Canara range of hills, also of Mysore	345
B neilli, *Day, Day, Fish Ind*, 569 *Fau. Br Ind*, *I* 314 Vern.—*Khudri*, MAR Habitat —Kurnul on the Tambudra river	346
B phutunio, *Day, Fish Ind*, 578 *Fau Br Ind*, *I*, 327 Vern —*Phutini pungti* BENG, *Kudji kerundi* URIYA Habitat —The rivers of Ganjam, Orissa, and throughout Bengal and Burma	347
B punctatus, *Day, Fish Ind*, 577, *Fau Br Ind*, *I*, 326 Vern —*Putter perli*, MALAY Habitat —The rivers of Malabar and the Coromandel coast	348
B puntio, *Day, Fish Ind*, 582, *Fau Br Ind*, *I*, 334 Vern —*Pungti*, BENG Habitat.—Ponds and ditches of Bengal and Lower Burma	349
B [illegible]	350
B sophore, *Day, Fish Ind*, 566 *Fau Br Ind I*, 309 Vern.—*Pungti*, BENG, *Chadu-per gi* TEL *Sophore* SANS Habitat —The rivers and ponds of Assam and the Khásia Hills	351
B [illegible] Ma	352
B stoliczkanus, *Day, Fish Ind* 577. *Fau Br Ind*, *I*, 326 Vern —*Nga th ne-glay*, BURM Habitat —Eastern Burma	353
B terio, *Day, Fish Ind*, 580 *Fau Br Ind*, *I*, 330 Vern.—*Tripungti*, BENG *Kakachia kerundi* URIYA Habitat —The fresh waters of Bengal and Orissa, to the Panjáb	354
[illegible]	355
B ticto, *Day, Fish. Ind*, 576, *Fau Br Ind*, *I*, 325 Vern —*Kaoli kotri*, HIND, *Kudji kerundi* URIYA, *Kah nipotiak* ASSAM Habitat —Rivers and tanks throughout India and Ceylon	356
B tor, *Day, Fish Ind*, 564, *Fau Br Ind*, *I*, 307 Vern —[illegible] *batra et ah* ... nd a ... nd is	357

358

Barbus vittatus; *Day, Fish. Ind., 582 ; Fau. Br. Ind., I., 333.*

Vern.—*Kúli*, HIND.; *Putti*, URIYA.

Habitat.—The rivers of Kutch, Mysore, Madras, Wynaad, Malabar, and Ceylon.

359

Barilius barila; *Day, Fish. Ind., 591 ; Fau. Br. Ind., I., 384.*

Vern.—*Perci*, HIND.; *Gilland, chaedri, barili*, BENG.

Habitat.—Rivers of the North-Western Provinces, Central Provinces, Bengal, Orissa, and Lower Assam. The several species of this genus, like most other carps, are largely employed as food by the Natives.

360

B. barna; *Day, Fish. Ind., 592 ; Fau. Br. Ind., I., 350.*

Vern.—*Barna, bali-bhola, bareli*, BENG.; *Bahri*, URIYA; *Balisundri oc-o-la*, ASSAM.

Habitat.—Assam, the Ganges and its branches; rivers of Bengal and Orissa.

361

B. bendelisis; *Day, Fish. Ind., 590 ; Fau. Br. Ind., I., 347.*

Vern.—*Khoksa*, BENG.; *Bahgra-bahri*, URIYA; *Pak-tah, kunnul, dah-rah, burreah, puck-wah-rl*, PB.; *Agustitti*, TAM.; *Johra*, MAR.

Habitat.—Rivers of Assam, the Himálaya, through the continent of India, as far as the Western Ghâts.

362

B. bola; *Day, Fish. Ind., 594 ; Fau. Br. Ind., I., 352.*

THE TROUT of Europeans in India.

Vern.—*Buggarah*, HIND.; *Bola, goha*, BENG.; *Buggush*, URIYA; *Korang*, ASSAM.

Habitat.—Rivers of North-Western Provinces, Orissa, Bengal, Assam, and Burma.

This is a very game fish, generally called "Trout" by the English in India, takes the fly well, and is one of those termed "*Raja mas*," or "chief of the fishes," in the Assam rivers.

363

B. gatensis; *Day, Fish. Ind., 592 ; Fau. Br. Ind., I., 349.*

RIVER CARP, OR NILGERRY TROUT of Europeans in India.

Vern.—*Choari, ári-candi*, TAM.

Habitat.—Rivers of the Western Ghâts, Malabar, and the Nilghiri hills, up to about 5,000 feet above the level of the sea.

364

B. guttatus; *Day, Fish. Ind., 593 ; Fau. Br. Ind., I., 351.*

Vern.—*Nga-la-wah*, BURM.

Habitat.—River Irrawadi, from Prome to Mandalay.

365

Belone annulata; *Day, Fish. Ind., 510 ; Fau. Br. Ind., I., 419.*

Vern.—*Pahmum kolah*, TAM.; *Wahlah-kuddera*, VIZAGAPATAM; *Toda*, MALAYS.

Habitat.—Seas and estuaries of India. The several species of Belone, or "Gar-fish," though generally of indifferent quality, are employed as food by the Natives.

366

B. cancila; *Day, Fish. Ind., 511 ; Fau. Br. Ind., I., 420.*

Vern.—*Kangkila*, BENG.; *Gungituri*, URIYA; *Coco-min*, TAM.; *Coahlan, morrahlú*, MALAY; *Nga-ohpoung-yoh, nga-phou-yo*, BURM.

Habitat.—Fresh waters of India, Ceylon, and Burma.

367

B. strongylura; *Day, Fish. Ind., 512 ; Fau. Br. Ind., I., 421.*

THE LONG-NOSED FISH.

Vern.—*Cungúr*, SIND; *Ushi-collarchi, coco-min*, TAM.; *Wodlah-muku*, TEL.; *Coplah*, MALAY; *Kuddera*, VIZAGAPATAM; *Toda*, MALAYS; *Thúk-o-dú-nú-dah*, ANDAMANS.

Habitat.—Seas and coasts of India.

368

Callichrous bimaculatus; *Day, Fish. Ind., 476 ; Fau. Br. Ind., I., 131.*

THE BUTTER FISH.

Vern —*Kani-pabda, chechra*, BENG , *Gung-wah-ri, puf ta*, HIND ; *Pobtah*, URIYA ; *Pah-boh*, ASSAM , *Pufla, gungwah, pallu*, PB , *Dimmon*, [illegible] *iu*, TEL ; *Gugli*,

[illegible] l Assam. Al- [illegible] Callichrous are

Callichrous macrophthalmus ; *Day, Fish Ind , 478 , Fau. Br. Ind , I , 132.* — 369
Vern —*Nga-nu than, nga myin-bouk*, BURM
Habitat.—Fresh waters of Madras, Assam, and Burma

C. malabaricus ; *Day, Fish. Ind , 478 , Fau Br. Ind , I , 133.* — 370
Vern.—*Chota-wahlah*, TAM ; *Mungi-wahlah*, MALAY
Habitat —Malabar coast of India

Caranx affinis ; *Day, Fish Ind , 219 , Fau. Br. Ind , I , 158.* — 371
THE HORSE MACKEREL.
Vern —*Warriparah*, TAM , *Battaparra*, MALAY
Habitat —Seas of India

C. oblongus ; *Day, Fish Ind , 222 , Fau. Br Ind , I., 163* — 372
Vern —*Ro-thul-dah*, ANDAMANS
Habitat —Seas of India

C. rottleri ; *Day, Fish. Ind , 213 , Fau Br. Ind., I , 150.* — 373
Vern.—*Komara-parah*, TAM , *Sora-parah*, TEL , *Woragu*, VIZAG
Habitat.—Seas of India.

Carassius auratus ; *Day, Fish. Ind , 552 , Fau Br Ind., I , 283* — 374
THE GOLDFISH, OR GOLDEN CARP.
Vern —*Nukta*, MAR
Habitat.—River Inderani, above Púna (*Watson*) Not indigenous to India, or only possibly so in Upper Burma (*Day*).

[illegible] — 375

C. acutus ; *Day, Fish Ind , 712 , Fau Br Ind., I , 10* — 376
Vern.—*Parrúwai sorrah*, TAM , *Sem sorrah*, TEL ; *Parl sorrah*, MALAY
Habitat.—Seas of India

C. ellioti ; *Fish Ind , 716 , Fau. Br. Ind , I , 15* — 377
Vern —*Paducan, adugu-pal sorrah*, TAM , *Pal sorrah*, VIZAG
Habitat —The Seas of India, not uncommon at Karachi

[illegible] — 378

C. limbatus ; *Day, Fish Ind., 716 , Fau. Br. Ind , I , 17.* — 379
Habitat —Very common along the sea borders of India, extending through the Indian Ocean. It attains at least 6 feet in length.

C. macloti ; *Day, Fish. Ind., 713 ; Fau. Br. Ind , I , 12* — 380
Vern —*Pala sorrah*, TEL
Habitat —A small shark of the Indian seas

C. melanopterus ; *Day, Fish. Ind , 715 , Fau. Br Ind , I , 14* — 381
Vern —*Caval sorrah, nella vekal sorrah, raman sorrah, mukhan sorrah, boka sorrah, ran sorrah*, TAM

Habitat.—Seas of India. A very large shark, the liver of one of which is said by Day to have weighed 270lb. It is, perhaps, of all the species the most prized as an oil-yielding fish.

382 **Carcharias menisorrah**; *Day, Fish. Ind., 716; Fau. Br. Ind., I., 16.*

Vern.—*Karamúti sorrah, ciga sorrah,* TEL.

Habitat.—The seas of India. A large shark attaining 12 feet or more in length.

383 **C. (Odontaspis) tricuspidatus**; *Day, Fish. Ind., 713; Fau. Br. Ind., I., 27.*

Habitat.—A large shark abounding in the seas of Sind, and attaining a length of at least 20 feet.

384 **Catla buchanani**; *Day, Fish. Ind., 553; Fau. Br. Ind., I., 287.*

Vern.—*Catla,* HIND., BENG., PB.; *Barkur,* URIYA; *Bonssa,* N.-W. P.; *Tambra,* BOMB.; *Botchi,* TEL.; *Tay-li,* SIND; *Nga-thaing,* BURM.

Habitat.—Rivers and tanks of Sind, the Panjáb, through India to the Kistna, and eastwards through Bengal and Burma to Siam.

This fish is largely employed for stocking tanks, and is much esteemed as an article of food when not over 2 feet in length; larger ones are coarse.

385 **Chætodon vagabundus**; *Day, Fish. Ind., 105; Fau. Br. Ind., II., 4.*

Vern.—*Pah-nú-dah,* ANDAMANS.

Habitat.—The seas of India.

386 **Chanos salmoneus**; *Day, Fish. Ind., 651; Fau. Br. Ind., I., 403.*

The MILK FISH or WHITE MULLET.

Vern.—*Tulu-candal,* TAM.; *Palah, bontah,* TEL.; *Hu-min,* KAN.; *Pu-min,* TULU.

Habitat.—The seas of India and tanks of fresh and brackish water in South Cánara. It was introduced into the latter artificial habitat by Hyder Ali, and still thrives.

387 **Chatoessus chacunda**; *Day, Fish. Ind., 632; Fau. Br. Ind., I., 386.*

Vern.—*Chacunda,* BENG.; *Muddirá,* TEL.; *Kore-paig-dah,* ANDAMAN.

Habitat.—The seas and estuaries of India and Burma. The several species of this genus, along with other members of the CLUPEIDÆ or herrings, are captured in great quantity, and largely consumed by the native population.

388 **C. manminna**; *Day, Fish. Ind., 633; Fau. Br. Ind., I., 386.*

Vern.—*Mackundi,* URIYA.

Habitat.—Fresh waters of Sind, and the districts watered by the Indus and its branches; also the main streams of the Ganges, Jumna, Brahmaputra, and Mahanuddi; through the tanks and estuaries of India and Assam, except the Deccan, South and Western India, and Ceylon.

389 **C. modestus**; *Day, Fish. Ind., 633; Fau. Br. Ind., I., 386.*

Vern.—*Nga-la-pay,* BURM.

Habitat.—Along the Bassein River, as high as the In-gay-gyi lake, also the Salwein at Moulmein.

390 **C. nasus**; *Day, Fish. Ind., 634; Fau. Br. Ind., I., 387.*

Vern.—*Kome,* URIYA; *Muddu-candai,* TAM.; *Kome,* TEL.; *Núnah,* MALAY.; *Pedda-kome,* VIZAG.

Habitat.—Seas of India. This fish is good eating, but bony.

391 **Chela argentea**; *Day, Fish. Ind., 601; Fau. Br. Ind., I., 364.*

WHITE CARP.

Vern.—*Chaya-vellachi, vellachi-candi,* TAM.

Habitat.—Bowany river (at the base of the Nilghiris), Cauvery river, and the rivers of Mysore. This and the other species enumerated below are eaten by the Natives.

392

Chela bacaila; *Day, Fish Ind, 603, Fau Br. Ind, I, 367*
Vern —*Chelliah*, HIND, *Bacaila*, BENG, *Jellahri*, URIYA; *Badishaya*, TEL
Habitat.—The rivers and tanks of India, except those of Malabar, Madras, Mysore, and parts of the Deccan

393

C. clupeoides; *Day, Fish Ind, 602, Fau Br Ind, I, 366*
Vern —*Tikani* DEC, *Baluki*, MAR, *Netteli vellache-kende*, TAM
Habitat —The rivers of Cutch, Jubbulpur, the Deccan, Madras, Mysore and Burma
This species is specially good eating.

394

C. [illegible]
[illegible] URIYA,
[illegible] ovinces,
Bengal, Orissa, and Assam

395

C. jorah; *Day, Fish Ind, 599, Fau. Br Ind, I, 361*
Vern —*Jorah*, MAR
Habitat —Beema river near Pairgaon in the Deccan.

396

C. [illegible] ASSAM, *Tuk*,
[illegible] al India, and

397

C. sardinella, *Day, Fish Ind, 600, Fau Br Ind, I, 363*
Vern —*Nga kun-nyat*, BURM
Habitat.—Irrawadi river at Rangoon, also the Salwein at Moulmein

398

C. sladoni; *Day, Fish Ind, 600, Fau. Br Ind, I, 363*
Vern —*Nya-yin boun sa* BURM
Habitat —Irrawadi river, as far north as Mandalay.

399

C. untrahi; *Day, Fish Ind, 601, Fau Br Ind, I, 364*
Vern —*Untrahi*, URIYA
Habitat —Mahanaddi river in Orissa, also the Cauvery and Colerún in Southern India.

400

C. alkootee; *Day, Fish Ind, 599. Fau. Br. Ind, I, 362.*
Vern —*Alkúti*, MAR
Habitat —Rivers of the Deccan (Doubtful species)

401

C[illegible]

402

Chirocentrus dorab; *Day, Fish Ind, 652. Fau. Br Ind, I., 368*
Vern —*Kunda, kundah*, URIYA, *Kiru-wahlah, mulú alley*, TAM, *Wahlah*, TEL, *Parang-párang*, MALAYS
Habitat.—The seas of India.

403

Chorinemus lysan, *Day, Fish Ind, 231. Fau Br Ind, II, 175*
Vern —*Parah*, HIND, *Toal-parah*, TAM, *Aken parah*, VIZAG, *Tallang raya*, MALAYS
Habitat —The seas of India Though considerably employed as food, the members of this genus are dry and rather tasteless

404

C. moadetta; *Day, Fish Ind, 230; Fau. Br Ind., II, 174*
Vern —*Tol parah*, VIZAG.
Habitat —Red Sea and seas of India.

FISH.	Indian Fishes

405

Chrysophrys berda; *Day, Fish. Ind., 140; Fau. Br. Ind., II., 44.*
BLACK ROCK-FISH of Europeans in Malabar.
Vern.—*Kala madwan,* HIND.; *Dun-de-a, jarras,* SIND.; *Currie, currapumattawa,* TAM.; *Kalamara,* TEL.; *Ari,* MALAY; *Mú-rú-ki-dah,* ANDAMAN.
Habitat.—The seas of India to the Malay Archipelago and beyond. This fish is excellent eating, greatly excelling the other species, and is commor in Malabar until July.

406

C. sarba; *Day, Fish. Ind., 142; Fau. Br. Ind., II., 47.*
Vern.—*Suffada-maddawa,* HIND.; *Vellamattawa,* TAM.; *Chitchilli,* TEL.; *Tin-til,* BELUCH.
Habitat.—The seas of India, especially abundant on the Madras coast. As food it is inferior to the berda.

407

Cirrhina cirrhosa; *Day, Fish. Ind., 547; Fau. Br. Ind., I., 277.*
Vern.—*Ven-kándi,* TAM.; *Arusu,* TEL.
Habitat.—Godavery, Kistna, and Cauvery rivers, and generally in Southern India. A very active fish, fair eating, but bony.

408

C. fulungee; *Day, Fish. Ind., 549; Fau. Br. Ind., I., 280.*
Vern.—*Fulungi,* MAR.
Habitat.—Rivers of Poona and the Deccan.

409

C. latia; *Day, Fish. Ind., 548; Fau. Br. Ind., I., 279.*
Vern.—*Kala-batta,* BENG.; *Behrah, tellarri,* PB.; *Curru,* SIND.; *Wattunah,* MAR.
Habitat.—The rivers of Bengal, Orissa, the North-West Provinces, the Panjáb, Sind, the Deccan, and along the Himálaya.

410

C. mrigala; *Day, Fish. Ind., 547; Fau. Br. Ind., I., 278.*
Vern.—*Mrigala, naim,* HIND.; *Rewah,* BENG.; *Mrigale, mirrgah,* URIYA; *Mor-ah-ki,* SIND; *Nga-kyin, nga-gyein,* BURM.; *Mirgal, mrigala,* SANS.
Habitat.—The rivers and tanks of Bengal, the North-West Provinces, the Panjáb, Sind, Kutch, the Deccan, and Burma. An excellent fish for stocking tanks.

411

C. reba; *Day, Fish. Ind., 549; Fau. Br. Ind., I., 279.*
Vern.—*Rewah,* HIND.; *Batta,* BENG.; *Chetchua-porah,* URIYA; *Sunni,* PB. and SIND; *Pil-aringan,* TAM.; *Ilemose, chittahri, pullarasu,* TEL.; *Lassim,* ASSAM; *Boggut, kólis,* MAR.
Habitat.—Rivers throughout India.

412

Clarias magur; *Day, Fish. Ind., 485; Fau. Br. Ind., I., 115.*
Vern.—*Magúr, mah-gur,* BENG.; *Mangri,* PATNA and MONGHIR; *Magurah,* URIYA; *Kug-ga,* PB.; *Yerri-vale,* TAM.; *Marpú,* VIZAG.; *Nga-khú,* BURM. and MUGH.
Habitat.—Fresh and brackish waters of the plains of India, Burma, Ceylon, and the Malay Archipelago. As food this fish is deemed highly nourishing, and is extensively salted in Burma.

413

Clupea fimbriata; *Day, Fish. Ind., 637; Fau. Br. Ind., I., 273.*
SARDINE, of Europeans in India.
Vern.—*Charri-addi,* HIND.; *Kich-uk-lonar,* SIND; *Púnduringa,* TAM.; *Cuttay-charlay,* MALAY.
Habitat.—Red Sea and the seas of India. Employed extensively as food and also in the preparation of fish-oil. All the members of this genus are much captured for food by the Natives, and some are considered delicious by Europeans.

414

C. ilisha; *Day, Fish. Ind., 640; Fau. Br. Ind. I., 276.*
THE SABLE OF SHAD FISH; HILSA.

Vern —*Hilsa, ilisha* Beng, *Ruri* of the Ganges, *Dumra* of the Indus *Pulla* Sind, *Ulum*, Iam, *Pulasa, pulasu* or *palasah*, Tel, *Olam min* Madras, *Nga tha louk*, Burm *Ikan truboh* Malays

Habitat —Persian Gulf and coasts of India and Burma, passing up the large rivers to breed

These fish are excellent as food until they have deposited their ova, when they become thin and positively unwholesome Their flavour has been compared to a combination of that of the salmon and herring, but though highly esteemed for the table, they are rather rich and difficult of digestion

Clupea longiceps, *Day, Fish Ind, 637, Fau Br Ind, I, 373* — 415

The Malabar Oil Sardine

Vern —*Mutthi, charlay, karlay*, Mal, *Mutthi* Kan, *Lonar* Sind, *Ligur* Beluch

Habitat —Sind and the Western coast of Ind a more rarely found on the Eastern, Ceylon, and Andaman coasts Large quant t es of oil are made from this species in Malabar

C variegata, *Day, Fish Ind, 639, Fau Br Ind, I, 375* — 416

Vern —*Nga la-bi* Burm

Habitat —The Irrawaddi and its branches

Coilia ramcarati, *Day, Fish Ind, 631, Fau Br Ind, I, 396* — 417

Vern —*Unalli* Uriya

Habitat —The rivers and estuaries of Bengal

Corica soborna, *Day, Fish Ind, 642, Fau Br Ind, I, 378* — 418

Vern —*Cut wdl ursi god hai* Uriya

Habitat —The rivers of Bengal and Orissa

Cybium commersonii, *Day, Fish Ind, 255, Fau Br Ind, II, 211* — 419

The Seer or Seir Fish

Vern —*Konam, mah-wu-laachi, ah ku-tah*, Tam, *Chambam* Malay *Ikantanggiri* Malays

Habitat —Seas of India The species of this genus when of the proper size, are cons dered amongst the most delicate of all marine fishes If under a foot in length they are dry, from 1½ to 2½ feet they are most excellent, while above this they become coarse

C guttatum, *Day, Fish Ind, 255, Fau Br Ind, II, 210.* — 420

The Seer or Seir Fish

Vern —*Wingeram* Vizag, *Arrakiah* Malabar

Habitat —The seas of India. Good eating, especially if cooked when quite fresh, salts well

C lineolatum, *Day, Fish Ind, 256, Fau Br Ind, II, 212* — 421

The Seer or Seir Fish

Vern —*Barim kutti* Malay, *Tanggiri*, Malays

Habitat —Seas of India

Cynoglossus lingua, *Day, Fish Ind, 433 Fau Br. Ind, II, 445* — 422

Sole, of Europeans in India

Vern —[illegible]

[illegible] *Fau Br Ind, I, 356* — 423

[illegible] Behar, and the Himálaya, at Dar- [illegible] ab The prettily-marked fish con-

stituting this genus, which are nearly allied to the Tench, are considerably used as food.

424 **Danio devario**; *Day, Fish. Ind.*, 595; *Fau. Br. Ind.*, I., 354.
Vern.—*Debari*, BENG.; *Bonkuaso*, URIYA; *Da-bah, dukri-e*, N.-W. P.; *Khan-ge, mál-le, pur-ran-dah*, PB.; *Chay-la-ri*, SIND.
Habitat.—The ponds and rivers of Bengal, the North-West Provinces, the Panjáb, Sind, Orissa, the Deccan, and Assam.

425 **D. malabaricus**; *Day, Fish. Ind.*, 595; *Fua. Br. Ind.*, I., 355.
Vern.—*Poarah-cunjú-candí*, TAM.
Habitat.—The Western coast of India and Ceylon.

426 **D. neilgherriensis**; *Day, Fish. Ind.*, 597; *Fau. Br. Ind.*, I., 357.
Vern.—*Cowlie*, TAM.
Habitat.—Rivers on the Nilghiri Hills.

427 **D. rerio**; *Day, Fish. Ind.*, 597; *Fau. Br. Ind.*, I., 358.
Vern.—*Poncha-geraldi*, ÚRIYA.
Habitat.—Rivers of Bengal and of the country extending down the Coromandel coast to Masulipatam.

428 **Diagramma crassispinum**; *Day, Fish. Ind.*, 78; *Fau. Br. Ind.*, I., 514.
BLACK ROCK-FISH of Europeans in Malabar.
Vern.—*Tawúlú pinnel*, TEL.
Habitat.—The seas of India. It attains 2 feet or more in length and is good eating.

429 **Discognathus lamta**; *Day, Fish. Ind.*, 527; *Fau. Br. Ind.*, I., 246.
HILL TROUT of Europeans.
Vern.—*Korafi-kaoli*, HIND.; *Choak-si*, BENG.; *Putter-chettah*, N. W. P.; *Dhoguru, kúrka*, PB.; *Kul-korava*, TAM.; *Pandi-pakke*, KAN.
Habitat.—Rivers and mountain streams throughout India and Ceylon. This fish is good eating, but putrefies very rapidly after death.

430 **Drepane punctata**; *Day, Fish. Ind.*, 116; *Fau. Br. Ind.*, II., 21.
Vern.—*Pulli, torriti*, TAM.; *Thetti*, TEL.; *Pündthi*, MALÁY; *Latte-terla*, VIZAG.; *Punnur*, SIND; *Nga-shengna*, BURM.; *Rúpi-chanda*, CHITTAG.; *Shengna-roét*, ARRAK.; *Shuk*, BELUCH.; *Gun-na-to-dash*, AND.
Habitat.—Seas of India. It is in most places esteemed as food.

431 **Dussumieria acuta**; *Day, Fish. Ind.*, 647; *Fau. Br. Ind.*, I., 399.
SARDINE of Europeans in Malabar.
Vern.—*Púnduouringa*, TAM.; *Kúrie*, MALAY.; *Tamban-bulat*, MALAYS; *O-pul-dah*, AND.
Habitat.—From Sind, through the seas of India. Cantor says this species, like the true Sardine, may be preserved *à huile*. It is very common in Malabar, and is excellent eating.

432 **Echeneis naucrates**; *Day, Fish. Ind.*, 257; *Fau. Br. Ind.*, II., 214.
Vern.—*Putthú-muday*, MALAY.; *Ubbay*, TAM.; *Ala-mottah*, VIZAG.; *Guddimi*, MALAYS.
Habitat.—Seas of India. The Malays consider these fish to be a valuable manure for fruit trees.

433 **Elacate nigra**; *Day, Fish. Ind.*, 256; *Fau. Br. Ind.*, II., 213.
Vern.—*Cuddul-verarl*, TAM.; *Pedda-mottah*, VIZAG.
Habitat.—Seas of India, to Japan.

434
435 **Eleotris butis**; *Day, Fish. Ind.*, 315; *Fau. Br. Ind.*, II., 296.
Vern.—*Kullahray*, MALAY.
Habitat.—Seas and estuaries of India.

436 **E. fusca**; *Day, Fish. Ind.*, 313; *Fau. Br. Ind.*, II., 293.
Vern.—*Bundi, balah-kera*, ÚRIYA; *Cul-cúndallum*, TAM.; *Púllan*, MALAY.
Habitat.—Brackish and fresh waters of the whole coast of India.

437 Eleotris ophiocephalus tumifrons, *Day, Fish Ind, 312, Fau Br Ind, II, 293*
Vern —*A-rig-dah, mu tuk-dah,* AND
Habitat —The coasts of the Andamans

438 Elops saurus, *Day, Fish Ind, 649, Fau Br Ind, I, 401*
Vern —*Ullahti* TAM *Jallugu, jinnagow,* TEL
Habitat —Seas of India

439 Engraulis hamiltonii, *Day, Fish Ind, 625, Fau Br. Ind, I, 389.*
Vern —*Purawah,* VIZAG
Habitat —Found throughout the seas of India The species of this genus are largely consumed by the Natives

440 E indicus, *Day, Fish Ind, 629, Fau Br Ind, I, 394*
WHITEBAIT, of Europeans in India
Vern —*Nettelli, teran gunı* TAM, *Nattú,* TEL, *Bunga-ayer, badah,* MALAYS, *Ju-rú cart-dah,* AND
Habitat.—Seas and tidal rivers of India It is extensively employed as food, cooked in the same way as whitebait

441 E malabaricus, *Day, Fish Ind, 625, Fau Br Ind, I, 389*
Vern —*Pur-relan* TAM, *Monangú* MALAY, *O-pul-d h,* AND
Habitat.—Coasts of Sind and through the seas of India

442 E purava, *Day, Fish Ind, 628, Fau Br Ind, I, 393*
Vern —*Phasa,* BENG, *Pussai tampara,* ÚRIYA, *Pedda-purawah,* VIZAG
Habitat —Seas and estuaries of both sides of India

443 E telara; *Day Fish Ind, 627, Fau Br. Ind, I, 392*
Vern.—*Phasa phasah, fessah pencha,* BENG, *Tampara,* URIYA, *Telara,* DINAJPUR, *Nga hta-yawet* BURM
Habitat —Rivers of Orissa, Bengal, Cachar, and Burma

444 Ephippus orbis, *Day, Fish Ind, 115, Fau Br Ind, II 20*
Vern —*Nalla torriti,* TAM; *Kol lid dah, kow lid-dah,* AND
Habitat —Seas of India

445 Equula daura, *Day Fish Ind, 240, Fau Br. Ind, II, 188*
Vern —*Dacer-karah,* VIZAG, *Rama karé,* TAM

[illegible] visceral irritation, resulting in diarrhœa or dysentery

446 E insidiatrix, *Day, Fish Ind, 242, Fau Br Ind, II, 191*
Vern —*Paarl curchi,* MALAY
Habitat —Seas of India Like the former species it is dried on the Malabar coast

447 E ruconius, *Day Fish Ind, 242, Fau Br Ind, II., 192*
Vern —*Rucon chanda* BENG *Tunka chandi,* ÚRIYA
Habitat —Seas and tidal rivers of India.

448 Etroplus maculatus, *Day Fish Ind, 415, Fau Br Ind, II, 429.*
Vern —*Cundahla,* ÚRIYA; *Shellel,* TAM; *burakas, chella kassu* TAM,

f Madras, and from South
It extends from the sea at

449

Etroplus suratensis; *Day, Fish. Ind., 415; Fau. Br. Ind., II., 430.*

Vern.—*Pitul-kas*, HIND.; *Cundahla*, ÚRIYA; *Karsaar, pillinchan*, TAM.; *Senel-kas, cashi-mara*, TEL.; *Corallia*, SING.

Habitat.—Fresh and brackish waters, along the coasts of Ceylon and India, as far as Orissa.

450

Eutropiichthys vacha; *Day, Fish. Ind., 490; Fau. Br. Ind., I., 128.*

Vern.—*Ni-much*, HIND.; *Váchá*, BENG.; *Butchua, nandi-butchua*, ÚRIYA; *Chel-li*, SIND; *Nga-myen-kouban, katha-boung*, BURM.

Habitat.—From the Panjáb, through the large rivers of Sind, Bengal, and Orissa; and variety **E. burmanicus**, in Burma. This species attains upwards of a foot in length, and is good eating.

451

Gagata cenia; *Day, Fish. Ind., 492; Fau. Br. Ind., I., 208.*

Vern.—*Jungla*, BENG.; *Puttuh-chettah*, ÚRIYA; *Cenia*, SIND; *Nga-nan-joung*, BURM.

Habitat.—Rivers of Bengal and Orissa, the Jumna, Ganges, and Indus, also those of Burma.

452

Gerres filamentosus; *Day, Fish. Ind., 98; Fau. Br. Ind., I., 537.*

Vern.—*Udan*, TAM.; *Joggari*, TEL.; *Wúdaahwah, wúdan*, VIZAG.; *Po-ra-chal-dah*, AND.; *Nga-wet-sat*, ARRAK.

Habitat.—Seas of India. This is the best eating of all the species of GERRES, though some of the others are also used as food to a small extent. They are mostly eaten by the indigent classes, being little esteemed whilst fresh, on account of their numerous bones and deficiency in flavour. As they salt and dry well, however, large numbers are thus prepared in many parts of the country for future use or export.

453

Glyphidodon sordidus; *Day, Fish. Ind., 385; Fau. Br. Ind., II., 386.*

Vern.—*Calamoiapota*, TEL.; *Chák-mud-dah*, AND.

Habitat.—Seas of India. Used for food.

454

Glyptosternum lonah; *Day, Fish. Ind., 496; Fau. Br. Ind., I., 196.*

Vern.—*Lonah*, MAR.

Habitat.—The rivers of the Deccan. Eaten, like other SILURIDÆ, by the poorer classes.

455

Gobius giuris; *Day, Fish. Ind., 294; Fau. Br. Ind., II., 266.*

Vern.—*Gúlú*, HIND.; *Gulah, bali gulah*, ÚRIYA; *Ulúway*, TAM.; *Issaki-dúndú, tsikideondoa*, TEL.; *Kurpah*, MAR.; *Warti-pú-lah, púan, kurdán*, MALAY; *Ab-bro-ny*, KAN.; *Gú-lú-wah, boul-la*, PB.; *Gúlú*, SIND; *Pú-dah*, AND.; *Nga-tha-boh*, BURM.

Habitat.—Fresh waters throughout the plains of India, Ceylon, and Burma. The small variety (? species), *kokius*, never exceeds a span, and appears to be entirely confined to the sea and estuaries along the coast of India and the Andamans.

456

G. striatus; *Day, Fish. Ind., 292; Fau. Br. Ind., II., 262.*

Vern.—*Mahturi, naolli* (=young), ÚRIYA; *Cúndallum, ulúway*, TEL.; *Cún-dallum*, TAM.

Habitat.—Fresh and back-waters of Madras and Kanara.

457

Haplochilus panchax; *Day, Fish. Ind., 523; Fau. Br. Ind., I., 417.*

Vern.—*Pang-chak*, BENG.; *Kana-kuri, bar-ro-gaddi*, ÚRIYA; *Cho-to-dah*, AND.; *Nga-saki*, MUGH.

Habitat.—From Orissa, through the Lower Province of Bengal, Burma, and Siam to the Malay Archipelago, also the Andamans.

458

Harpodon nehereus; *Day, Fish. Ind., 505; Fau. Br. Ind., I., 412.*

THE BOMBAY DUCK.

Vern.—*Nehare, bumalo, bummaloh*, BENG.; *Cucah sawahri, coco mottah*, TEL.; *Bummelo*, MALAY; *Wangara-was*, MADRAS; *Wana-motta*, VIZAG.; *Luli*, MALAYS.

Habitat —Seas and estuaries of India, most common at Bombay, but decreasing in numbers down the Malabar coast This fish is highly esteemed as food, whether fresh or salted, in the latter form it is extensively employed as a relish with curries, and is known as "Bombay duck"

459

Hemirhamphus buffonis ; *Day, Fish Ind*, *516*, *Fau. Br. Ind*, *I.*, *427*.
Vern —*Ku-dú-rock-o-dah*, ANDAMANS
Habitat —The seas and tidal rivers of Bombay, Bengal, and the Andamans. The roes of the fishes of this genus are collected largely on the Malabar coast of India, where they are esteemed a great delicacy.

460

H. cantori ; *Day, Fish Ind*, *514*. *Fau Br. Ind*, *I.*, *423*.
THE GUARD FISH of the Straits Settlements
Vern —*Toda-pendek*, MALAY
Habitat.—Bombay, Malabar, Madras, and the seas of India

461

462

H reynaldi ; *Day, Fish. Ind*, *515*. *Fau. Br. Ind*, *I*, *425*
Vern —*Morrul*, MALAY
Habitat —The seas of India (*Day*) Malabar and the tanks around Calcutta (*Watson*).

463

... Br Ind, *I*, *267*.
... aungsi, morala, BENG ; *Lassim*,
... issa, Assam, and Burma The ... below, are employed as food by the Natives Some, such as the ROHU, are also highly esteemed by Europeans

464

L anza ; *Day, Fish Ind*, *544*, *Fau Br Ind*, *I*, *272*
Vern —*Arisa*, BENG , *Coal*, TAM , *Nga lu*, BURM
Habitat —The Wynaad and Bowany rivers at the foot of the Nilghiri hills, also the Cauvery river

465

L. boga ; *Day, Fish. Ind*, *543*, *Fau Br. Ind*, *I*, *269*.
Vern —*Bangum batta, boga*, BENG , *Kala battali*, URIYA, *Arisa*, TEL , *Kinda-min, coal-arinsa-candi*, TAM , *Kyouk-nya lu* BURM
Habitat —The rivers and tanks of the Gangetic Provinces, Madras, and Burma

466

L. calbas ...
Ve...
nga ong tong, BURM
Habitat —The fresh waters of the Panjáb, Sind, Cutch, the Deccan, Southern India, and Malabar, and from the Kistna through Orissa, Bengal, and Burma

467

... Fau Br Ind, *I*, *265*.
... Kul ka batta, BENG.; ...
... Himálaya, also a native of the Brahmaputra in Assam

468

L. dussumieri ; *Day, Fish. Ind*, *538*, *Fau. Br. Ind.*, *I.*, *262*
Vern —*Tâli*, MALAY
Habitat —Rivers of South Malabar, Ceylon, and ... Bombay.

469 Labeo fimbriatus ; *Day, Fish. Ind., 536 ; Fau. Br. Ind., I., 258.*

Vern.—*Bahrum*, URIYA ; *Vencandi, shaal*, TAM. ; *Ruchu, gandu-menu*, TEL. ; *Bobri*, MAR.

Habitat.—The rivers of the Panjáb, Sind, and the Deccan, also of Southern India, at least as far as Orissa. It is a fairly large fish, attaining a length of 1½ feet, and though bony, is good eating.

470 L. gonius ; *Day, Fish. Ind., 537 ; Fau. Br. Ind., I., 261.*

Vern.—*Cursa, collúse*, HIND. ; *Kurchi, kursi, goni*, BENG. ; *Cursua*, URIYA ; *Courie, bahtur*, ASSAM ; *Mosúl*, TEL. ; *Cir-re-oh*, SIND ; *Nga-pay, nga-dane, nga-hú*, BURM.

Habitat.—The Indus in Sind, through the North-Western Provinces, Bengal, and Orissa, to Ganjam, as low as the Kistna ; also Assam and Burma. It is a large fish attaining the length of 5 feet, and is much used for stocking tanks.

471 L. kontius ; *Day, Fish. Ind., 539 ; Fau. Br. Ind., I., 264.*

Vern.—*Carramanni, carú-múli-candi*, TAM.

Habitat.—The rivers along the base of the Nilghiris, and the Cauvery and Coleroon in all their branches down to the coast.

472 L. nandina ; *Day, Fish. Ind., 535 ; Fau. Br. Ind., I., 258.*

Vern.—*Nandin*, BENG. ; *Nga-ohn-don, nga-ne-pyah, nga-yin-pounsa*, BURM.

Habitat.—The fresh waters of Bengal, Assam, and Burma.

473 L. pangusia ; *Day, Fish. Ind., 541 ; Fau. Br. Ind., I., 266.*

Vern.—*Loanni, pengusiya*, BENG.

Habitat.—Rivers and tanks of the Himaláya ; found also generally throughout Sind, the Deccan and the North-West Provinces, Bengal, Cachar, and Assam.

474 L. rohita ; *Day, Fish. Ind., 538 ; Fau. Br. Ind., I., 262.*

THE ROHO, or ROHÚ.

Vern.—*Rui, rowi, rohita, rui-mutchli*, BENG. ; *Ruhu*, URIYA ; *Rui*, ASSAM ; *Nga-myit-chin, nga-myit-tsan-ni*, BURM.

Habitat.—Fresh-waters of Sind, and from the Panjáb through India and Assam to Burma. A large fish of 3 feet or more in length, esteemed excellent as food, and propagated with care in ponds in Bengal. Yields oil, for which it is principally employed in the North-West Provinces. U. C. Dutt remarks that the bile of this species is employed in medicine by the Hindús.

475 Lactarius delicatulus ; *Day, Fish. Ind., 245 ; Fau. Br. Ind., II., 196.*

Vern.—*Sudumu*, TELUGU ; *Purruwah*, MALAY. ; *Chundawah*, VIZAG.

Habitat.—Seas of India. It is insipid, but is eaten, either fresh or salted, by the Natives.

476 Lates calcarifer ; *Day, Fish. Ind., 7 ; Fau. Br. Ind., I., 440.*

COCK-UP, *Calcutta* ; NAIR FISH, *Malabar*.

Vern.—*Begti, bhekti*, BENG. ; *Durruah, bekkut*, URIYA ; *Dangara*, SIND ; *Painni-min, koduwa, karona*, TAM. ; *Pandu kopah, pandu-menu*, TEL. ; *Nuddi-min, nair-min*, MALAY. ; *Padúmenú*, VIZAG. ; *Kuduva*, MADRAS ; *Nga-tha-dyk*, ARRAC. ; *Koral baor*, CHITTAGONG ; *Todah*, AND. ; *Kakadit*, BURM ; *Ikan siyakup*, MALAYS.

Habitat.—Seas, back-waters, and mouths of tidal rivers. This fish is excellent eating, when obtained from the vicinity of large rivers. It salts well, and from it some of the best "Tamarind fish" is prepared.

477 Lepidocephalichthys guntea ; *Day, Fish. Ind., 609 ; Fau. Br. Ind., I., 220.*

Vern.—*Gúnteah, gúteah, bilgagora*, BENG. ; *Kondaturi, gupkari, jubbicowri*, URIYA ; *Nga-tha-ley-doh*, BURM.

Habitat —The rivers and tanks of India, except those along the Malabar coast, Mysore, and south of the Kistna Eaten by Natives

478 Lethrinus rostratus (miniatus), *Day, Fish. Ind, 134, Fau Br Ind, II, 37*
Vern —*Po-t ing-dah*, AND
Habitat —Seas of India

479 Lobotes surinamensis, *Day, Fish Ind, 84, Fau Br Ind, I, 519*
Vern —*Chota bekkut*, URYAH, *Musalli*, TAM, *Parrondi*, MALAY, *Ikan batu*, MALAYS
Habitat —East coast of Africa, and seas of India It is excellent as food

480 Lutjanus argentimaculatus; *Day, Fish Ind, 37. Fau Br Ind. I, 472*
THE RED ROCK-COD of the Straits Settlements
Vern —*Rangú*, TEL, *Singara, senan karawa*, MADRAS, *To-go-re-dah*, ANDAMANS
Habitat —Throughout the seas of India The fish attains [illegible] of

481 L. decussatus, *Day, Fish Ind, 47, Fau Br. Ind, I, 481*
Vern —*Ju-win-dah*, ANDAMANS
Habitat —Seas of India, especially abundant on the coasts of the Andamans, where it is readily captured by bait

482 L. erythropterus (annularies); *Day, Fish. Ind, 32, Fau Br Ind, I, 466*
Vern —*Susta*, URIYA, *Chirtah*, VIZAG, *An-na kah-ro-dah* ANDAMANS
Habitat – Seas of India It is captured all the year round at Madras, but is most abundant during the cold months

483 L. fulviflamma; *Day, Fish Ind, 41, Fau Br Ind, I, 475.*
Vern —*Shemkara, currumay*, TAM, *Vella chembolay*, MALAY, *Antika dundiawah* VIZAG
Habitat —Seas of India, especially abundant off the coasts of Madras

484 L. jahngarah, *Day, Fish Ind, 40, Fau Br Ind, I, 474*
Vern —*Purruwa*, URIYA, *Sillau*, VIZAG
Habitat —Seas of India It attains two feet or more in length, is esteemed as food, and is extensively cured by drying on the coast of Orissa

485 L. johnii, *Day, Fish Ind, 42, Fau Br Ind, I, 476*
Vern —*Chembolay*, MALAY, *Dundiawah*, VIZAG, *Nga pa ni*, BURM
Habitat —Seas of India

486 Macrones aor, *Day, Fish Ind, 444. Fau Br Ind, I, 479*
Vern —*Aor*, BENG, *Alli*, or *addi*, *arriah alli*, *gugah alli*, URIYA, *Singala*, *sang go ah*, PB, *Cambu kelleti* TAM *Mukul jellah*, *muti jella*, TEL, *Singhari*, SIND, *Singhala*, MAR, *Nga joung*, BURM
Habitat —Rivers throughout Sind and India to Burma The species of Macrones here enumerated are employed as food by the poorer classes, but are of inferior quality, being rather insipid

487 M cavasius, *Day, Fish Ind, 447, Fau Br Ind, I, 155*
Vern —*Kavasi tengara*, BENG, *Guntea, cuntea*, URIYA, *Vella kelleti, cutta* TAM, *Muti jella, nahra jella*, TEL, *Singti surah*, MAR, *Nga sin zine*, BURM
Habitat —Rivers from Sind, throughout India, Assam, and Burma

488 M corsula, *Day, Fish Ind, 446, Fau Br Ind, I, 153*
Vern —*Punjah gaggah*, URIYA, *Nga ike*, BURM
Habitat —Rivers, from Orissa through Bengal and Assam

FISH. Indian Fishes

489 Macrones leucophasis; *Day, Fish. Ind., 449; Fau. Br. Ind., I., 158.*
Vern.—*Nga-pet-lek, nga-nouk-thawa,* BURM.
Habitat.—Rivers of Burma.

490 M. malabaricus; *Day, Fish. Ind., 450; Fau. Br. Ind., I., 160.*
Vern.—*Cutti min,* TAM.
Habitat.—Malabar, coast of India, and the Wynaad, extending inland to the gháts in South Cánara.

491 M. punctatus; *Day, Fish. Ind., 445; Fau. Br. Ind., I., 153.*
Vern.—*Sholang kelleté, psetta-kelleté,* TAM.
Habitat.—The Bowany river at the base of the Nilghiris.

492 M. tengara; *Day, Fish. Ind., 447; Fau. Br. Ind., I., 156.*
Vern.—*Kuttahrah,* HIND.; *Tengara, tengrah,* BENG.; *Bikuntia,* URIYA; *Ting-ga-rah,* ASSAM; *Karaal, ting-ga-rah,* PB.; *Saku-jella,* TEL.; *Nga-zin-zine,* BURM.
Habitat.—Northern India, the Panjáb, and Assam.

493 Mastacembelus armatus; *Day, Fish. Ind., 340; Fau. Br. Ind., II., 334.*
THE SPINED EEL, or THORNY-BACKED EEL.
Vern.—*Barua,* HIND.; *Bahm, bummi, gouti,* BENG., URIYA; *Bahm, kahm, gro-age,* PB. and SIND; *Kul-aral, sha-ta-rah,* TAM.; *Mudi-bommi-day,* TEL.; *Nga-maway-doh-nga,* BURM.
Habitat.—From Sind, throughout the fresh and brackish waters of the plains and hills of India, Ceylon, and Burma. It attains 2 feet or more in length, and is good eating, especially when curried, or fried.

494 M. pancalus; *Day, Fish. Ind., 340; Fau. Br. Ind., II., 333.*
THE SMALL SPINED EEL.
Vern.—*Ju-gar,* HIND.; *Turi, bahru,* URIYA; *Tu-rañ,* ASSAM; *Par-paraal,* TEL.; *Chen-da-la, gürchi, gro-age,* PB.
Habitat.—Deltas of large rivers of India, and localities near the sea. Good eating, whether fresh or salted.

495 Megalops cyprinoides; *Day, Fish. Ind., 650; Fau. Br. Ind., I., 402.*
Vern.—*Punnikaú, naharn,* URIYA; *Moran cundai,* TAM.; *Cunnay,* MALAY.; *Kundinga,* VIZAG.; *O-pul-dah,* AND.; *Nga-tan-youet,* BURM.
Habitat.—Fresh waters and estuaries of India and Ceylon. It is occasionally captured in rivers, but much more frequently in tanks.

496 Mugil corsula; *Day, Fish. Ind., 354; Fau. Br. Ind., II., 349.*
THE MULLET.
Vern.—*Undala,* HIND.; *Corsula, in-ge-lí,* BENG.; *Kakunda,* URIYA; *Hurd-wah-re,* PB.; *Nga-zen,* BURM.
Habitat.—Rivers and estuaries of Bengal and Burma, extending far above tidal influence in the fresh water. It attains 1½ foot in length and is considered excellent eating. Ainslie remarks regarding this genus: "they are the most excellent fish in India, but are perhaps a little too fat and rich for those who are delicate. They are used both in the fresh and salted state and are much prized by the natives. The spawn salted and dried forms a kind of *cavier*, called by the Italians *boborágo*" (*Mat. Ind., I., 227*). The same objection to its use, however, exists as with the OPHIOCEPHALIDÆ, certain classes refusing to eat the mullet, owing to the resemblance of its head to that of a serpent.

497 M. cunnesius; *Day, Fish. Ind., 349; Fau. Br. Ind., II., 342.*
THE MULLET.
Vern.—*Mahlah,* MALAY; *Cunnesi,* VIZAG.; *Sada-parauda,* MADRAS.
Habitat.—Seas of India.

498 M. hamiltonii; *Day, Fish. Ind., 354; Fau. Br. Ind., II., 349.*
THE MULLET.
Habitat.—Rivers of Burma.

Mugil ocur, Day, Fish Ind, 353, Fau Br Ind, II, 384 — 499
MULLET
Vern.—*Kola-kende, mahlah* MALAY
Habitat—Seas of India and China. The season for capturing these fish along the western coast commences about the middle of November, when they swarm close inshore in order to enter estuaries and the mouths of large rivers to deposit their ova, and extends to about February The roes are collected and dried in the sun, with or without the use of salt.

M parsia, Day, Fish Ind, 350, Fau Br Ind, II, 344 — 500
MULLET
Vern—*Tarui*, BENG, *Pasi kende paranda* MADRAS
Habitat.—Seas and estuaries of India It attains at least 1½ feet in length and is commonly captured for food in the Hooghly at Calcutta.

M planiceps (tade), Day, Fish Ind, 350, Fau Br Ind, II, 344 — 501
MULLET
Vern—*Bongon* BENG *Jumpul* MALAYS
Habitat—Seas, estuaries and tidal rivers of India Common in the Hooghly

M poicilus, Day, Fish Ind, 351, Fau Br Ind, II, 345 — 502
MULLET
Vern—*Cunnumbú* MALAY
Habitat—Rivers of Bombay and the Western coast of India, especially common during the colder months

M seheli, Day, Fish Ind, 355, Fau Br Ind, II, 350 — 503
MULLET
Vern—*Magi* URIYA
Habitat—Seas of India

M waigiensis, Day Fish Ind, 359, Fau Br Ind, II, 356 — 504
FRESH WATER MULLET, Eng.
Vern.—*Do-dah*, ANDAMANS
Habitat—Throughout the seas of India ascending rivers to the limit of tidal influence during the monsoon It attains a foot or more in length, and is good eating

Muræna sathete, Day, Fish Ind, 668, Fau Br Ind, I, 77 — 505
Vern.—*Sathete* BENG
Habitat—Bay of Bengal and Penang especially affecting estuaries

M tile, Day, Fish Ind, 668 Fau Br Ind, I, 76 — 506
THE EEL.
Vern—*Tile*, BENG, *Vellangu* TEL, *Ahir*, MAR, *Chemlú pan ú* MADRAS, *Palug-dah*, ANDAMANS
Habitat—Seas and estuaries of Bengal, ascending tidal rivers, and common in the Hooghly at Calcutta

Murænesox telabon, Day, Fish Ind, 661, Fau Br Ind, I, 90 — 507
THE BAMBOO FISH
Vern.—*Kotah kulivi-pan bú*, TAM, *Culim poun* TEL, *Tala bon*, VIZAG, *Boschi* ANDAMANS
Habitat—Seas of India, attaining 10 feet or more in length

Nandus marmoratus, Day, Fish Ind, 129 Fau Br Ind, II, 82. — 508
Vern.—*Vadhul* HIND, *Latha gudtha* BENG, *Bodosi gossiporah* URIYA *Gad gud-di bad-vad hi*, ASSAM, *Mussoassah*, PB *Septi isoppitay*, TEL, *Mutahri*, MALAY
Habitat—Fresh and brackish waters of India and Burma, common in ditches and inundated fields

509 **Nemacheilus zonatus**; *Day; Fish, Ind., 618; Fau. Br. Ind., I., 233.*
Vern.—*Mugah*, BENG.
Habitat.—Throughout the Jumna and Ganges and their affluents, Bírbhúm, Assam, and Orissa.

510 **Notopterus chitala**; *Day, Fish, Ind., 654; Fau. Br. Ind., I., 407.*
Vern.—*Chitala, chitol*, BENG.; *Chitul*, URIYA; *Si-tul*, ASSAM; *Gundun*, SIND.
Habitat.—A large fish attaining 4 feet or more in length, found in the fresh waters of Sind, Lower Bengal, Orissa, Assam, Burma, and Siam. Hamilton-Buchanan writes: "The belly is uncommonly rich and well flavoured, but the back contains numerous small bones, and a strong prejudice exists against using this fish as food, owing to its being supposed to live on human carcasses.

511 **N. kapirat**; *Day, Fish., Ind., 653; Fau. Br. Ind., I., 406.*
Vern.—*Moh*, HIND; *Pholoe*, BENG.; *Pulli*, URIYA; *Ambutan-wahlah, chota wahlah*, TAM.; *Kau-du-li*, ASSAM; *Moh, but, purri*, PB.; *Nallak-tattah*, MYSORE; *Nga-hpeh, nga-phe*, BURM.
Habitat.—Fresh and brackish waters of India. It grows to 2 feet or more in length and is salted in Burma.

512 **Ophichthys boro**; *Day, Fish, Ind., 664; Fau. Br. Ind., I., 94.*
Vern.—*Boro, harancha, hijala*, BENG.
Habitat.—Seas and estuaries of India. The natives in some parts of Bengal imagine that this fish proceeds from the ear of a porpoise.

513 **Ophiocephalus barca**; *Day, Fish, Ind., 365; Fau. Br. Ind., II., 361.*
THE WALKING FISH.
Vern.—*Barca*, BENG.; *Bora-chang*, BUTAN.
Habitat.—Large rivers of the Bengal Presidency. All the fish of this genus have hollow cavities in their heads, an amphibious system of respiration, are able to exist for a lengthened period out of water, and can travel some distance over the ground, especially where it is damp. They are all useful as food, and the possibility of carrying them in moist vessels for a long distance renders them extremely valuable. Some classes of natives, however, object to them on account of the resemblance of their heads to those of serpents.

514 **O. gachua**; *Day, Fish. Ind., 367; Fau. Br. Ind., II., 364.*
THE WALKING FISH.
Vern.—*Dheri dhok*, HIND.; *Chenga, choyung*, URIYA; *Chen-gah*, ASSAM; *Doarrah*, PB.; *Para korava, munrú*, TAM.; *Karavu*, MALAY.; *Mah korava*, KAN.; *Korah-mottah*, VIZAG.; *Chad-dah*, AND.
Habitat.—Fresh waters, throughout India, Ceylon, Burma, and the Andamans. Described by Thomas as an excellent live bait.

515 **O. marulius**; *Day, Fish. Ind., 363; Fau. Br. Ind., II, 360.*
THE WALKING FISH, or MURREL.
Vern.—*Pu murl*, HIND.; *Sál*, URIYA; *Ha-al*, ASSAM; *Kubrah sál, daulah*, PB.; *Pu verarl*, TAM.; *Pula chapa*, TEL.; *Choari verarl, curavu*, MALAY.; *Húvina murl*, KAN.; *Murrul*, MAR.; *Sowarah*, VIZAG.; *Nga-yan-dyne*, BURM.
Habitat.—Fresh waters (principally rivers), from Ceylon and India to China. This fish is described by Thomas as affording excellent sport either with live bait or fly. It is one of the best of the OPHIOCEPHALIDÆ as a food fish, and is excellent for stocking tanks.

516 **O. punctatus**; *Day, Fish. Ind., 367; Fau. Br. Ind., II., 364.*
THE BLACK CABOOSE.
Vern.—*Phúl dhok*, HIND.; *Gorissa, gurrie, cartua-gorai*, URIYA and ASSAM; *Dullúnga*, PB.; *Dhoalí*, SIND.; *Korava, para-kora wa*, TAM.; *Muttah*, TEL.; *Beli-korava*, KAN.; *Nga-ain*, MUGH.

Habitat —Commonly found in fresh waters, of the plains, preferring stagnant ponds to streams

517

Ophiocephalus striatus, *Day, Fish Ind, 366, Fau Br Ind, II, 363*
THE WALKING FISH, or MURREL
Vern —*Morrul, murl dheri murl* HIND, *Sol chena* BENG, *Sola* URIYA *Verarlu, currupu verarl* TAM, *Sowarah kora, muttageddasa* TEL *Verarl wrahl*, MALAY *Muttah* VIZAGAPATAM *Kúchina miri* KAN; *Lulla* SING, *Nga-ain-di*, MUGH, *Nga yaw*, BURM, *Ikan haruan* MALAYS
Habitat —Fresh waters throughout the plains of India Like O marulius, it affords excellent sport, is good as food though bony, and is a very good stock for tanks The Telaings are said to employ this fish in one of their religious ceremonies.

518

Opisthopterus tartoor, *Day, Fish Ind, 646, Fau. Br Ind, I, 384*
Vern —*Tartoore* VIZAGAPATAM
Habitat —From Sind, through the seas of India

519

Oreinus plagiostomus, *Day, Fish Ind, 530, Fau Br Ind, I, 250*
THE KASHMIR TROUT
Habitat —Rivers of Afghánistan Kashmir, and Butan All the species of Oreinus are used as food

520

O richardsonii, *Day Fish Ind, 530, Fau Br Ind, I, 250*
THE KEMAON TROUT
Vern —*Asla* NEPAL
Habitat.—The rivers of Nepál, Butan and the Sub-Himálayan range

521

O sinuatus, *Day, Fish Ind, 529, Fau Br Ind, I, 248*
TROUT of Europeans
Vern —*Gúl gulli saul*, PB, *Jis* KASH
Habitat —Afghánistan and Himálayan rivers not extending to the plains far from the base of the hills It attains 2 feet in length, and is pretty good eating but bony, it is too rich for some people, but does not deleteriously affect those accustomed to it

522

[illegible]

[illegible] p[illegible] feeder, care must be taken to prevent its obtaining access to foul substances

523

O olfax, *Day Fish Ind, 372, Fau Br Ind, II, 369*
THE GOURAMY
Habitat —A native of China and the Malay Archipelago but introduced into tanks near Calcutta Madras and the Nilgiris It attains 20lb or more in weight and is excellent eating when kept in clean water

524

Osteogeniosus militaris, *Day, Fish Ind, 469 Fau Br Ind, I 190*
Vern.—*Pont kelit* [illegible]

It is eaten by the "fish maws" from

525

Otolithus maculatus, *Day, Fish Ind, 196, Fau Br Ind, II, 127*
Vern.—*Birralli* URIYA
Habitat —Seas of India Both species of this genus are eaten and their [illegible]

526

O ru[illegible]
F

Vern.—*Jarang-gigi*, MALAYS.

Habitat.—Seas of India. A large fish, attaining 2½ feet or more in length, and fairly good for the table.

527 **Pangasius buchanani**; *Day, Fish. Ind., 470; Fau. Br. Ind., I., 142.*

Vern.—*Cula-kelletti*, TAM.; *Banka-jella*, TEL.; *Jellum*, URIYA.

Habitat.—The large rivers and estuaries of India, Assam, and Burma. It attains upwards of 4 feet in length and is eaten, though a foul feeder.

528 **Pellona motius**; *Day, Fish. Ind., 643; Fau. Br. Ind., I., 381.*

Vern.—*Ursi, alise*, URIYA.

Habitat.—Rivers of Assam, Bengal, and Orissa, descending as low as the coast. Used as food.

529 **P. sladeni**; *Day, Fish. Ind., 645; Fau. Br. Ind., I., 383.*

Vern.—*Nga-zen-bya*, BURM.

Habitat.—River Irrawaddi, as high as Mandalay. It is eaten by the Burmans.

530 **Perilampus atpar**; *Day, Fish. Ind., 598; Fau. Br. Ind., I., 359.*

Vern.—*Kachhi, atpar*, BENG.; *Bonkuaso*, URIYA; *Mor-ri-ah*, PB.; *Bi-dah*, SIND; *Arku-konssi*, TEL.; *Nga-man-dan, ya-paw-nga, nga-phyin-gyan*, BURM.

Habitat.—Rivers of Sind, throughout India and Burma. The carps of this genus are eaten by natives.

531 **P. laubuca**; *Day, Fish. Ind., 598; Fau, Br. Ind., I., 360.*

Vern.—*Dannahrah*, HIND.; *Layubuka, dankena*, BENG.; *Bankoe*, URIYA; *Moh-do-ni-konah, her-bag-gi*, ASSAM; *Cún-che-li-e*, N.-W. P.; *Nga-me-loung*, BURM.

Habitat.—The rivers of Bengal, Orissa, Central India, Ganjam, Assam, and Burma.

532 **Plagusia bilineata**; *Day, Fish. Ind., 431; Fau. Br. Ind., II., 452.*

Vern.—*Aralu*, TAM.; *Ikan-ledah*, MALAYS; *Jerri-potú*, VIZAGAPATAM.

Habitat.—Seas of India. Used as food.

533 **Platax teira**; *Day, Fish. Ind., 235; Fau. Br. Ind., II., 182.*

Vern.—*Cha-la-dah, gú-na-dah*, ANDAMANS.

Habitat.—Seas of India. Russell and Cantor both remark that the flavour of this fish is excellent.

534 **Platycephalus insidiator**; *Day, Fish. Ind., 276; Fau. Br. Ind., II., 238.*

CROCODILE FISH of Europeans in Malabar.

Vern.—*Ulpathy*, TAM.; *Irrwa*, TEL.; *Nga-paying-ki*, MUGH.; *A-ra-wud-dah, chau-ur-dah*, AND.

Habitat.—Seas of India. Eaten by the lower classes of natives, but much dreaded on account of the severe irritative wounds caused by its spines.

535 **Plotosus arab**; *Day, Fish. Ind., 483; Fau. Br. Ind., I., 113.*

Vern.—*Ingeli*, VIZAG.; *Múrghí*, MALAY; *Similáng-karong*, MALAYS.

Habitat.—Seas of India. Wounds from the pectoral spines of this fish are much dreaded, as they occasion phlegmonous inflammation, or even tetanus.

536 **P. canius**; *Day, Fish. Ind., 482; Fau. Br. Ind., I., 113.*

Vern.—*Kani-magur*, BENG.; *Irung-kell-etti*, TAM.; *Li-mi-dah, bondah*, ANDAMANS.

Habitat.—The estuaries of India, Burma, and the Malay Archipelago. A large fish 3 feet or more in length, the flesh of which is supposed by the Malays of Batavia to have emmenagogue properties.

537 **Polyacanthus cupanus**; *Day, Fish. Ind., 371; Fau. Br. Ind., II., 368.*

Vern.—*Punnah*, TAM.; *Heb-bu-ti*, TEL.; *Ta-but-ti*, KAN.; *Caringanah, wúnnutti*, MALAY.

Habitat —Fresh waters of Malabar and the Coromandel coasts, often found in ditches, paddy-fields, and other shallow waters Although of small size, it is employed as food by the lower classes of Natives Jerdon remarks that wounds from the spines of this fish cause severe burning pain, which lasts for two or three hours.

Poly— 538

Katha, or *ka ku-yan* BURM

Habitat.—The seas of India All the fish of this genus are excellent as food, and also form one of the principal sources of "fish maws"

P. paradiseus; *Day, Fish Ind, 176, Fau Br Ind, II, 102.* 539

MANGO FISH of Europeans in Calcutta

P. tetradactylus; *Day, Fish Ind, 180, Fau. Br. Ind, II, 106.* 540

THE ROWBALL

Vern —*Teriya-bhanggan*, BENG, *Polun kala*, TAM, *Yerra kala*, MADRAS, *Maga-jelli*, VIZAG, *To-bro-dah*, ANDAMANS, *Py tha-corah*, MALAY; *Ikan salangan, sinanghi* or *salanghi*, MALAYS

Habitat.—The seas of India. This is a very large fish, 6 feet or more in length, indeed, Buchanan records a specimen which formed a load for six men It is excellent eating, and is salted on the Madras coast

Pristipoma guoraka, *Day, Fish Ind, 75, Fau Br Ind, I, 512* 541

Vern —*Guoraka*, VIZAG

Habitat —The seas of India, said also to have been captured in fresh water All the species of this genus are fair as food but are not much esteemed, the air vessels also are in some places collected for isinglass

P. hasta; *Day, Fish, Ind, 73, Fau Br Ind, I, 510* 542

Vern.—*Caroua, corake*, TAM, *U-rug nud-dah, kur kú-to-dah*, ANDAMANS

Habitat.—The seas of India.

P. — 543

Pristis cuspidatus, *Day, Fish. Ind, 728, Fau Br Ind, I, 37* 544

THE SAW FISH

Vern — *Vela min*, TAM

A huge fish, attaining e The flesh is highly China, oil is extracted word scabbards, or for

Psettus argenteus; *Day, Fish Ind, 235, Fau Br. Ind., II, 180.* 545

Vern —*Nga-pus-sund*, MUGH, *U-chra dah*, ANDAMANS

Habitat.—Seas of India Used as food.

FISH.

Indian Fishes

546

Pseudeutropius atherinoides; *Day, Fish. Ind., 473; Fau. Br. Ind., I., 141.*

Vern.—*Put-tah-re*, HIND.; *Battuli, bopotassi, jemmi carri*, URIYA; *Boh-du-ah, potasi, doyd*, ASSAM; *Put-tul, chel-li*, PB.; *Ah-hi*, SIND; *Akku-jella*, TEL.; *Nga-than-chyeik*, BURM.

Habitat.—Throughout the rivers of India and Assam. All the species of this genus are excellent as food, but in some localities are to be avoided, as they consume offal.

547

P. garua; *Day, Fish. Ind., 474; Fau. Br. Ind., I., 141.*

Vern.—*Buchua*, HIND.; *Puttosi, garua, pullosi*, BENG.; *Punia buchua*, URIYA; *Dhen-ga-nu*, SIND.

Habitat.—Found generally throughout the larger rivers of India, Assam, and Burma.

548

P. goongwaree; *Day, Fish. Ind., 471; Fau. Br. Ind., I., 137.*

Vern.—*Gégli, gúngwarí*, MAR.; *Nga-myen-ole-hpa*, BURM.

Habitat.—The rivers of Bengal, the Deccan, and Burma.

549

P. murius; *Day, Fish. Ind., 472; Fau. Br. Ind., I., 139.*

Vern.—*Butchua*, HIND.; *Muri-vacha, motusi*, BENG.; *Muri-vacha*, URIYA; *Ke-raad*, PB.; *Chhotká váchoyá*, KUSI.

Habitat.—The rivers of Sind, Bengal, Orissa, and Assam.

550

P. taakree; *Day, Fish. Ind., 471; Fau. Br. Ind., I., 138.*

Vern.—*Tákri*, MAR.; *Salava-jella*, TEL.; *Nga-zin-sap, nga-myin*, BURM.

Habitat.—The fresh waters of Púna, the Deccan, and the rivers Kistna and Jumna. This fish attains upwards of a foot in length, and is one of the best of the genus as a food.

551

Pseudorhombus arsius; *Day, Fish, Ind., 423; Fau. Br. Ind., II., 441.*

Vern.—*Ikan-siblah*, MALAYS; *Ky-tha-thong-dah*, ANDAMANS.

Habitat.—Through the seas and estuaries of India. Used as food.

552

Psilorhynchus balitora; *Day, Fish. Ind., 527; Fau. Br. Ind., I., 244.*

Vern.—*Balitora*, BENG.

Habitat.—Hill streams and rapids in North-east Bengal and Assam. Employed as food by Natives.

553

Pseudoscarus rivulatus; *Day, Fish. Ind., 413; Fau. Br. Ind., II., 426.*

Vern.—*Ar-dah*, ANDAMANS.

Habitat.—Seas of India. Eaten by Natives of some parts of the coast.

554

Pterois volitans; *Day, Fish. Ind., 154; Fau. Br. Ind., II., 62.*

Vern.—*Parrúah*, MALAY; *Kodipungi*, VIZAG.; *Chib-ta-ta-dah*, AND.

Habitat.—Throughout the seas of India. Employed as food in some parts of the country.

555

Pteroplatea micrura; *Day, Fish. Ind., 741; Fau. Br. Ind., I., 56.*

Vern.—*Perúm tiriki*, TAM.; *Tappu cúti*, TEL.; *Tenki-kunsul*, VIZAG.; *Lek kyouk temengnee*, BURM.

Habitat.—The seas of India. Used as food.

556

Raconda russelliana; *Day, Fish. Ind., 646; Fau. Br. Ind., I., 384.*

Vern.—*Potassah-fessah, phasah*, BENG.

Habitat.—The Bay of Bengal; the young are common in the Sunderbans. Largely consumed by the native population.

557

Rasbora buchanani; *Day, Fish. Ind., 584; Fau. Br. Ind., I., 337.*

Vern.—*Rasbora*, BENG.

Habitat.—The rivers of India, Assam, and Burma. Most common in the valley of the Ganges and along the Coromandel coast. Used as food by the Natives.

558

R. daniconius; *Day, Fish. Ind., 584; Fau. Br. Ind., I., 336.*

Vern.—*Mile-lo-ah*, HIND.; *Danikoni, angjani*, BENG.; *Jilo, dundikerri*, URIYA; *Doh-ni-ko-nah*, ASSAM; *Chin-do-lah, raan-kaal-le, charl*, PB.;

Ovaricandi purruvd kende, TAM, *Kokanutchi*, MALAY, *Jonir*, KUTCH, *Neddean jubbo*, KAN, *Nga-doung-ei, nga nauch youn*, BURM

Habitat —The rivers of India and Ceylon Much more common than R buchanani

559

Rhynchobatus ancylostomus, *Day, Fish. Ind*, *730*, *Fau Br. Ind*, *I*, *41*.

THE MUD SKATE

Vern —*Manu ulavi*, TAM, *Manu ulava, naladindi*, TEL

Habitat —Throughout the seas of India The species of this genus are valued, like other skates, for their skins, fins, and livers

560

R. djeddensis, *Day, Fish Ind*, *730*, *Fau. Br Ind*, *I*, *40*

Vern —*Ulavi, tipi ulavi*, TEL, *Walawah tenki*, VIZAG, *Ranja*, MAR

Habitat —Seas of India A large fish attaining 6 feet or more in length, the flesh of which is considered nourishing, whether eaten salted or fresh, and the oil from its liver is much esteemed

561

Rhynchobdella aculeata, *Day, Fish Ind.*, *338*, *Fau Br Ind*, *II*, *331*

THE SAND OR SPINED EEL

Vern -*Bara, thuri, gutti* URIYA *Tou-rah* ASSAM *Aral cul, monah aral* TAM, *Bommiday, bomri*, TEL, *Theluja*, SING, *Nga mawaydoh nya*, BURM

Habitat.—Brackish waters within tidal influence, also throughout the deltas of the large rivers of India, Burma, and Sind, but apparently [illegible] b and Malabar coasts It [illegible] ertain classes owing to its [illegible] " They have less of a dis [illegible] are more sought after by Natives, the highest of whom in Bengal make no scruple in eating them, and by Europeans they are esteemed the best of the eel kind " It salts well, but the flesh is reputed to be slightly heating

562

[illegible]

long distances

563

R hastata, *Day, Fish Ind*, *456*, *Fau Br. Ind*, *I*, *168*

Vern.—*Kuterni*, MAR

Habitat.—The rivers of the Deccan and Puna, and the Tambudra and Kistna

564

R [illegible]

565

Rohtee belangeri, *Day, Fish Ind*, *587*, *Fau Br Ind*, *I*, *342*

Vern —*Kilay*, TEL, *Nga hpeh-oung, nga net-pya*, BURM

Habitat —The Godavery river, and throughout Burma Employed as food by the Natives

566

R cotio, *Day, Fish Ind*, *587*, *Fau Br Ind*, *I*, *340*

Vern —*Gurdah, chen da lah, muckni*, HIND, *Roti, gunta*, BENG, *Gunda, gollund*, URIYA, *Puttu, duh-rie*, SIND, *Phenk*, MAR, *Nga hpan-ma*, BURM

Habitat —Found in rivers, ponds, and ditches from Sind throughout India (except the Malabar coast and south of the Kistna) and Burma.

567

Rohtee ogilbii; *Day, Fish. Ind.*, 588; *Fau. Br. Ind.*, I., 342.
Vern.—*Kunninga*, TEL.; *Rohti*, MAR.
Habitat.—The Kistna and Godavery, and the rivers of the Deccan.

568

Saccobranchus fossilis; *Day, Fish. Ind.*, 486; *Fau. Br. Ind.*, I., 125.
THE SCORPION FISH.
Vern.—*Bitchu-ka-mutchi, singi*, HIND.; *Singgi, singhi*, BENG.; *Singi*, URIYA; *Singi, shin-i*, ASSAM; *Lo-har*, SIND; *Lahūrd* (young), *nullie* (adult), PB.; *Thay-li, tharli*, TAM.; *Marpu*, TEL.; *Kahri-min*, MALAY.; *Nga-gyi, nga-kyi*, BURM. and MUGH.
Habitat.—The fresh waters of India, Ceylon, Burma, and Cochin-China, attaining 1 foot or more in length. It is considered exceedingly wholesome and invigorating by Natives, though in some places deemed impure by the Brahmins. In Burma it is salted.

569

Saurida tumbil; *Day, Fish. Ind.*, 504; *Fau. Br. Ind.*, I., 410.
Vern.—*Ulúway, cul-nahmacunda*, TAM.; *Arranna*, MALAY.; *Badimottah*, VIZAG.
Habitat.—Seas of India. Though rather dry and insipid it is considerably used as food.

570

Sciæna bleekeri; *Day, Fish. Ind.*, 185; *Fau. Br. Ind.*, II., 112.
Vern.—*Soh-li*, BENG.
Habitat.—Bombay. This species is extensively salted at Gwadur.

571

S. coitor; *Day, Fish. Ind.*, 187; *Fau. Br. Ind.*, II., 115.
Vern.—*Coitor*, BENG.; *Botahl, putteriki*, URIYA; *Vella-ketcheli*, TAM.; *Nga-ta-dun, nga-pok-thin*, BURM.
Habitat.—Throughout the larger rivers of India and Burma, descending to the sea at certain seasons.

572

S. cuja; *Day; Fish. Ind.*, 187; *Fau. Br. Ind.*, II., 115.
Vern.—*Cuja*, BENG.
Habitat.—The estuaries of the Ganges.

573

S. diacanthus; *Day, Fish. Ind.*, 189; *Fau. Br. Ind.*, II., 118.
Vern.—*Chaptis*, BENG.; *Katcheli, nalla-katcheli*, VIZAG.; *Ikan sambareh*, MALAYS.
Habitat.—The seas of India, ascending tidal rivers and estuaries. It is found in the Hooghly as high as Calcutta.

574

S. maculata; *Day, Fish. Ind.*, 190; *Fau. Br. Ind.*, II., 119.
Vern.—*Cúrúwa, vari katcheli*, TAM.; *Cutlah*, MALAY.; *Sari-kullah*, VIZAG.; *Taantah*, BEL.
Habitat.—The seas of India. It is not considered such a good food fish as the other species.

575

Scomber microlepidotus; *Day, Fish. Ind.*, 250; *Fau. Br. Ind.*, II., 203.
THE MACKEREL.
Vern.—*Karah*, BENG.; *Karna-kita*, or *karnang-kullutan*, TAM.; *Kanagurta*, TEL.; *Cunny-ila*, MAD.; *Ila*, MALAY.; *Kanagurta*, VIZAG.; *Nga-congri*, MUGH.; *Lük-wa-dah*, ANDAMANS.
Habitat.—Indian seas. A small fish rarely exceeding 10 inches in length, very common throughout the cold season in Malabar. It is extensively salted and dried, but although good eating is seldom brought to the tables of Europeans, as it rapidly taints, and if eaten in that condition gives rise to visceral irritation.

576

Semiplotus mc'clellandi; *Day, Fish. Ind.*, 550; *Fau. Br. Ind.*, I., 281.
Vern.—*Sundari, sentori, lah-bo-e, rajah-mas* (=" King's fish"), ASSAM.
Habitat.—The rivers of Assam, especially the upper portions of that district, but found as low as Goalpara; also in Burma. It is asserted that this fish obtained the vernacular name of "king fish," owing to the

fact that in olden times, when captured, it had always to be taken to the Rajas for their own consumption Day, however, remarks that, as it is very common, this explanation is improbable, and it is more likely that it was so named from a tax being levied on its capture Very varying accounts of the value as food of the Semiplotus exist McClelland states that it is the most delicious in Assam, while Day records from personal experience that it is rich and liable to set up intestinal irritation

577

Serranus diacanthus; *Day, Fish Ind, 17, Fau Br Ind, I, 449.*
Vern —*Damba* SIND, *Chándcha*, BELUCH, *Killi min*, MALAY
Habitat —Seas of India All the species of this genus of the PERCIDÆ are good as food, though coarse when very large A small amount of isinglass also is obtained from their air vessels

578

S [illegible] ... sore ... *ahtu*

579

S. malabaricus (pautherinus), *Day, Fish Ind, 19, Fau Br Ind, I, 451*
[illegible] *--h bontú*, TEL *Bál,* ... *yga kakadit*, BURM,

580

Sillago sihama; *Day, Fish Ind, 265, Fau Br. Ind, II, 224*
WHITING of Europeans in Madras
[illegible]

581

[illegible]

582

Sphyræna jello; *Day, Fish. Ind, 342, Fau Br. Ind, II, 335*
Vern —*Chilahu*, MALAY, *Yellow*, VIZAG, *Thal lib dah*, ANDAMANS
Habitat.—Seas of India A large fish attaining 5 feet or more in length, used as food, although not much esteemed

583

[illegible]

584

S niger; *Day, Fish Ind, 247, Fau Br. Ind, II, 199.*
THE BLACK POMFRET.
Vern —*Baal*, URIYA; *Karupú voval*, TAM, *Nalasandawah*, TEL.; *Karapu-voval* MADRAS, *Nala sandawah*, VIZAG *Kar-arwuli*, MALAY., *Ko lig-dah*, ANDAMANS, *Bawar, bawal tumbak*, MALAYS

FLACOURTIA, Comm. Gen., Pl. I., 128.

A genus of trees or shrubs, often spinous, containing about twelve species, native in the Old World, of which some are cultivated in tropical countries. There are eight Indian species, of which five are of economic interest.

603

Flacourtia Cataphracta, Roxb.; Fl. Br. Ind., I., 193.

MANY-SPINED FLACOURTIA, Eng.; PRUNIER D'INDE, Fr.

Vern.—Talispatri, paniamlak, pani-amla, HIND.; Paniálá, BENG.; Jangama, tambati, jaggam, BOMB.; Tambat, MAL.; Tálishpátra, GUZ.; Talisapatri, TAM.; Tálisapatri, TEL.; Naywá, BURM.; Prâchinamalaka, talisha, SANS.; Zarnab, ARAB.; Talisfatar, PERS.

References.—Roxb., Fl. Ind., Ed. C.B.C., 739; Kurz, For. Fl. Burm., 74; Gamble, Man. Timb., 17; Pharm. Ind., 27; Ainslie, Mat. Ind., II., 407; O'Shaughnessy, Beng. Dispens., 9; Dymock, Mat. Med. W. Ind., 2nd Ed., 72; Pharmacographia Indica, I., 152; Irvine, Mat. Med., Patna, 7; Lisboa, U. Pl. Bom., 7, 146, 277; Birdwood, Bom. Pr., 8; Balfour, Cyclop., I., 1120; Journ. As. Soc., 1867, 80, II., 2; Home Dept. Cor., 239; Journ. Agri.-Hort. Soc., XII., 345.

Habitat.—A small tree of Assam, Bengal, Burma, Bombay, and the Western Ghâts. Commonly cultivated in India.

OIL. Seeds. 604

Oil.—The SEEDS yield an oil, of which little is known, but further information regarding it might lead to the opening up of a trade in an article which even the poorest cultivator might supply from the wild plant.

MEDICINE. Leaves. 605 Shoots. 606 Bark. 607 Fruit. 608

Medicine.—The LEAVES and YOUNG SHOOTS taste like rhubarb, and are supposed to possess astringent and stomachic properties. They are prescribed in diarrhœa, weakness, and consumption. An infusion of the BARK is also given for hoarseness. The FRUIT is said by Dymock to be recommended as useful in bilious conditions.

Compare with Abies Webbiana.

SPECIAL OPINIONS.—§ "The leaves are said to have diaphoretic properties" (Deputy Sanitary Commr. Joseph Parker, M.D., Poona). "Used as a powder in chronic bronchitis" (Surgeon-Major J. J. L. Ratton, M.D., Salem). "Sold in Mysore bazars and used in combination with other drugs for cough, &c." (Surgeon-Major John North, Bangalore). "Under the name Talispatri are sold in the bazar the leaves of a pine (Abies Webbiana)" (Asst. Surgeon Sakharam Arjun Ravat, L.M., Girgaum, Bombay). Talispatri is probably this plant and not Abies.—Ed.

FOOD. Fruit. 609

Food.—Taylor in his "Topography of Dacca" writes: "The FRUIT of this tree, which is of a purple colour, and of the size and appearance of a plum, is sold in the city during the rains." Dr. Watson reports that the fruit is eaten in Allahabad. It is also generally used as an article of food in Assam.

TIMBER. 610

Structure of the Wood.—Heavy, brown, close-grained, rather hard and brittle, and takes a fine polish (Kurz, For. Fl. Burma).

611

F. inermis, Roxb.; Fl. Br. Ind., I., 193.

Vern.—Tomi-tomi, MAL. (S.P.); Tambat, jaggam, BOMB.; Ubbolu, KAN.

References.—Roxb., Fl. Ind., Ed. C.B.C., 739; Kurz, For. Fl. Burm., 74; Gamble, Man. Timb., 17; Lisboa, U. Pl. Bomb., 7, 146.

Habitat.—A middling-sized tree, probably introduced from the Moluccas. At present found in Sylhet, South India, and Martaban. It blossoms during the dry season, and ripens its fruit towards the close of the rains.

FOOD. Fruit. 612

Food.—The FRUIT, says Roxburgh, is too sour to be eaten raw, but makes very good tarts. In the Moluccas, however, it is eaten.

613

F. montana, Grah.; Fl. Br. Ind., I., 192.

Vern.—Attak-ke-jar, attak, BOMB.; Champer, MAR.; Hannu sampige, KAN.

Habitat.—A very thorny tree found in Kanara and the Concan.

FOOD. Fruit. 614

Food.—"The FRUIT—used as a fruit" (Birdwood, Bom. Products).

Flacourtia Ramontchi, *L'Herit, Fl Br. Ind, I., 193* 615

Syn —F. SAPIDA, *Roxb*

Vern —

References —*Roxb, Fl Ind, Ed, C B C., 739, Brandis, For Fl, 18*

Medicine — Native inoculators in the Panjáb use the THORNS for breaking the pustule of small-pox on the 9th or the 10th day After child-birth among natives in the Deccan the SEEDS are ground to a powder with turmeric and rubbed all over the body to prevent rheumatic pains from

MEDICINE. Thorns 616 Seeds. 617 Gum 618 Bark 619 Fruits. 620 FOOD. Fruit 621 Leaves 622 TIMBER 623

is of the size of the plum, has a sharp but sweetish taste, and is used either raw or cooked The leaves are employed as cattle fodder

Structure of the Wood —Red, hard, close and even-grained, splits, but does not warp, and is durable Weight about 53lb Is used for turning and agricultural implements.

F. sepiaria, *Roxb, Fl Br Ind, I, 194* 624

Vern —*Kondai,* HIND, *Sherawane, sargal, dajkar, jidkar, khatái, kingro'* PB, *Bainch,* C P, *Atrúna, tambat,* BOMB, *Kanru, kana régu,* TEL

References —

75

It also occurs about Delhi, the Sulimans Is extensively

MEDICINE. Leaves. 625

and ROOTS is supposed to be rated in sesamum oil is used as a liniment in rheumatism (*Wight; Ainslie, Rheede*)

Roots. 626 Bark. 627

Food —The FRUIT is said to be eaten by the natives of the Panjáb tracts where it is found, but it is small, hard, and insipid, it is, however, sometimes described as "pleasant, refreshing, and sub acid." The LEAVES are thrashed out for cattle fodder

FOOD Fruit. 628 Leaves 629

FLAME TREES.

630

Different trees, having brilliant flowers, which in most cases appear before the leaves when seen at a distance, they have the appearance of

being on fire—hence the popular name Flame Trees. The principal trees of this nature are :—

Amherstia nobilis.
Bombax malabaricum.—Silk Cotton Tree.
Butea frondosa and superba.—Tésú Flowers.
Cæsalpinia pulcherrima.—Barbadoes Pride or Gold Mohur Tree (a corruption of the Hind. name *Gulmor* or Peacock Flower).
Cochlospermum Gossypium.—White Silk Cotton Tree.
Lagerstrœmia Flos-Reginæ.
Poinciana regia.—The Mascarene.
Pterospermum acerifolium.
Rhododendron arboreum, &c., &c.

Flax, Common, *see* Linum usitatissimum, *Linn.*; LINEÆ.

631 **Flax (New Zealand).** The fibre of Phormium tenax.

632 **Flea-bane.**

A powder made of the dried flowers or seeds of several species of plants for the destruction of, or rather driving away of, fleas.

In Persia the flowers of three species of Pyrethrum are employed. In India the flea-bane, commonly used, is the *Purple Flea-bane* or seed of Veronia anthelmintica (*Willd*). See Pyrethrum and Veronia.

Fleece of Sheep, *see* Skins.

(*G. Watt*).

FLEMINGIA, *Roxb.*; *Gen. Pl.*, *I*, *544*.

633 **Flemingia congesta,** *Roxb.*, *Fl. Br. Ind.*, *II.*, *228*; *Wight, Ic.*, *t. 390*; [LEGUMINOSÆ.

Vern.—*Bara-salpan, bhalia, supta, cusunt,* HIND.; *Bara-salpan, bhalia,* BENG.; *Buru ekasira nari, bir but,* SANTAL; *Batwasi,* NEPAL; *Mipit-múk,* LEPCHA; *Dangshukop,* MICHI; *Dowdowlá,* BOMB. and MAR.; *Tha kya nai,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 572; Gamble, List of Trees, Shrubs, &c., of Darjeeling, 28; Dals. & Gibs., Bomb. Fl., 75; Rev. A. Campbell's Report on Econ. Prod., Chutia Nagpur, No. 8465; Atkinson, Econ Prod. N.-W. P., Pt V., 94; Kew Reports, 1881, 50; Kew Off. Guide to the Mus. of Ec. Bot., 45; Report, Bot. Gardens, Nilgiri, 1883-84, 10.*

Habitat.—An erect, woody shrub, common in the thickets and forests of the warmer parts of India.

The *Flora of British India* reduces to this species the following forms described by Roxburgh as distinct (see *Ed. C. B. C., pp. 571-72*):—F. procumbens, F. prostrata, F. nana, F. congesta, and F. semialata, forming four varieties:—

634 *Var. 1*—semialata (*sp. Roxb.*; syn. F. stricta, *Wall.*; F. prostrata, *Roxb.*)—Central Himálaya, ascending to 5,000 feet in altitude.

635 *Var. 2*—latifolia (*sp. Benth.*)—Khasia Hills, altitude 2,000 to 3,000 feet.

636 *Var. 3*—Wightiana (*sp. Grah.*)—Nilghiris, Bhutan, Ava.

637 *Var. 4.*—nana (syn. F. procumbens *Roxb.*; F. capitata, *Ham.*)—Central and Eastern Himálaya and the Concan.

HISTORY. 638 Modern Commercial History of *Waras* Dye.—In a correspondence forwarded by the Secretary of State for India to the Revenue and Agricultural Department, Sir J. D. Hooker communicated certain facts regarding the *waras* drug and dye of Africa which led to the suggestion that that substance was obtained from a Flemingia and probably one of the forms of the common Indian species F. congesta. Roxburgh nearly a century before had drawn attention to the garnet-coloured hairs on the pods of

HISTORY.

that plant, but was apparently ignorant of the fact that these yielded a valuable dye In the Kew Report for 1881 further information was published regarding *waras*, and it was there suggested that it was in

The Director of

to the Madras

ie Indian species

a sample of the

by Mr. Wardle,

Baker, F.R S, in the '*Flora of Tropical Africa*,' as *Flemingia rhodocarpa*. But my colleague, Professor Oliver, F.R S, whose kindness is only equalled by his sagacity, has made the curious discovery that a Flemingia apparently confined to South India, F Grahamiana, *W & A*, is not specifically distinguishable from F. rhodocarpa; the pods are in fact clothed with the same peculiar epidermal glands so characteristic of that species The '*waras*' plant is therefore really to be found in India after all. In creating a new species for the '*waras*' plant, Mr. J G. Baker pardonably neglected the comparison of the material he was working upon with specimens of the species occurring in so remote and botanically

ly both F. rhodocarpa and F. Grahamiana would have to be referred, along with F congesta, to forms of one species It is on the probability of such a rearrangement and as a matter of economy of space that the writer has thrown the present account of the African *waras* into one place and under one species instead of attempting to discuss it under several

DYE. 639

Dye.—Mr. Lawson wrote of his experiments with the Indian powder procured by him from F. Grahamiana and F. congesta: "The *waras* yields a beautiful dye when applied to animal substances such as silk or wool, but it is inferior as a dye when used for the purpose of colouring vegetable products such as cotton or linen Mr. Thiselton Dyer has kindly obtained for me a London expert's opinion upon the value of *waras*, and I regret to say that it is not such as is likely to lead one to believe that it will ever become an object of commercial interest I may mention that when I was in Madras last winter, I saw at the Agri-Horticultural Gardens flower-show a specimen of *waras* in a native dyer's

an Indian knowledge of the dye property of the Flemingias The Rev A Campbell, in his Report on the Economic Products of Chutia Nagpur,

The Waras Dye.

DYE.

writes of F. congesta : "The pods are said to yield a dye." It would thus appear that the Santals are familiar with the dye, and as Mr. Campbell does not call this *waras*, there is no room for doubting but that he alludes to a fact, the interest of which, beyond the limits of his own province, Mr. Campbell was in all probability not aware of.

It may serve a useful purpose to reproduce here Major Hunter's description of the collection and purification of the dye as pursued in Africa, at Harrar :—

"In the neighbourhood of the city '*wars*' is not now raised from seed sown artificially, and it is left to nature to propagate the shrub in the surrounding terraced gardens. The plant springs up, among jowari, coffee, &c., in bushes scattered about at intervals of several yards, more or less. When sown, as among the Gallas, it is planted before the rains in March. If the soil be fairly good a bush bears in about a year. After the berries [pods] have been plucked, the shrub is cut down to within six inches of the ground. It springs up again after rain and bears a second time in about six months, and this process is repeated every second year until the tree dies. Rain destroys the berry [pod] for commercial purposes; it is therefore only gathered in the dry season ending about the middle of March. The bush grows to a maximum height of six feet, and it branches close to the ground. The growth is open and the foliage sparse. Each owner has a few acres of land.

"In the middle of February 1884, the following processes were observed :—

"The leaves [? fruiting shoots] of some plants were plucked and allowed to dry in the sun for three or four days. (The picking is not done carefully and a considerable quantity of the surrounding twigs, &c., is mixed with the berries [pods].) The collected mass was placed on a skin heaped up to about six or eight inches high and was tapped gently with a short stick about half an inch thick. After some time the pods were denuded of their outer covering of red powder which fell through the mass on to the skin. The upper portion of the heap was then cleared away and the residual reddish green powder was placed in a flat woven grass dish with a sloping rim of about an inch high. This receptacle was agitated gently and occasionally tapped with the fingers, the result being the subsidence of the red powder and the rising to the surface of the chaffy refuse, which latter was carefully worked aside to the edge of the dish and then removed by hand. This winnowing was continued until little remained but red powder. (No great pains are even taken to eliminate *all* foreign matter.) A *rotl* was sold in 1884 for about 13 piastres=1 rupee 10 as. nearly.

"'*War*' is sent to Arabia, chiefly to Yemen and Hadhramaut, where it is used as a dye, a cosmetic, and a specific against cold. In order to use it, a small portion of the powder is placed in one palm and moistened with water; the hands are then rubbed smartly together, producing a lather of a bright gamboge colour, which is applied as required" (*W. T. Thiselton Dyer, Pharm. Jour., May 31, 1884*).

Mr. Wardle regards *waras* as a distinctly inferior dye to *kamála* (Mallotus philippinensis). The latter has been exported from India to Europe for many years past as an adulterant or substitute for the former. Mr. Wardle writes of *waras:* "This substance contains only a small amount of colouring matter compared with the vegetable yellow dyes of commerce, and no colour can be obtained from it which will bear comparison in depth and richness with those produced from *kamála* or *kapila,* for which, as stated in the Kew Report for 1880, it is used as a substitute, and which is certainly a very much more valuable dye-stuff.

DYE.

"As far as my observations have gone, *waras* is inferior to *kamala* in permanence, as regards the action of light." "The colour produced with *waras* is easily turned brown by alkaline solutions, whilst *kamala* is only slightly reddened Both dyes, however, resist the action of acids

shade"

In Bombay the word *waras* (as a pure coincidence probably) is given

It would thus appear clear that from whatever cause has proceeded the confusion which till recently existed in modern literature, the early writers fully understood the properties and sources of the two plants—*kamala* and *waras*

MEDICINE.
Powder
640

Roots
641

FOOD.
Pods.
642

Flemingia Grahamiana, *W. & A ; Fl Br. Ind, II, 228*

643

powder more freely than other known Indian forms

authors on
tita) seem of
is somewhat
are recorded

F. Strobilifera, *R & M*

644

Is repeatedly mentioned for its medicinal properties It is the *sim busak* of the Santals, the roots of which, the Rev A Campbell informs us, are sometimes given in epilepsy, it is the *Bolu* of the Darjeeling hill tribes and the *Pha-tan phyu* of Pegu In the Central Provinces buffaloes are said to eat this species

MEDICINE.
645
FODDER.
646

F. vestita, *Benth, Fl Br Ind, II, 230.*

647

A small creeping plant with dark brick red flowers which appear in July to August This is said to be cultivated in "some parts of North-West India for the sake of its edible tuberous roots, which are nearly

FOOD
648

elliptical and about an inch long" (*Lindley and Moore's Treasury*). The writer has never seen it cultivated, nor can he discover any Indian author who alludes to this fact, but around Simla the plant is very plentiful, and along with Vigna vexillata—the *gúlái* or *ban* (wild) *mung*, of the N.-W. Himálaya—the roots are regularly collected and eaten, especially by herd boys attending on cattle. They have a sweet, agreeable, nutty flavour, and if systematically cultivated might come to afford a useful new vegetable somewhat of the character of the Jerusalem Artichoke. The Himálayan form has few flowers, much less crowded than in the variety described as **nilgheriensis**; *Wight, Ic., t. 987.*

(*J. Murray.*)

649

FLESH, Animal.

In India the flesh of animals is not only used as a food, but from very early times has been much employed medicinally by native practitioners, both internally as *ghritas*, and externally as *taila páka*.

FOOD. 650

Food.—Sanskrit writers describe the different properties of the flesh of various animals in great detail. By them the flesh of the goat, domestic fowl, peacock and partridge, is said to be easily digested and suited for the sick and convalescent; the meat of the deer, sambar, hare, quail, and partridge is recommended for habitual use; while beef and pork are viewed as hard to digest and unsuited for daily use.

MEDICINE. 651

Medicine.—Medicinally the goose, fowl, jackal, goat, snail, and mungoose are principally employed, their flesh being prescribed for many forms of disease, but chiefly those of the nervous system.

The *ghrita* and the *taila páka* into which they are compounded contain in addition a great variety of vegetable drugs (*U. C. Dutt, Hind. Mat. Med., p. 286*).

652

FLINT.

Vern.—*Chakmak*, HIND.; *Chakimuki*, TAM., TEL.

Flint is a massive compact form of almost pure silica and is generally of a dark-brownish colour. It breaks with a conchoidal surface, and forms sharp cutting edges. True flints are of rare occurrence in India, but in the manufacture of implements in prehistoric times, horses' bones, agates, &c, were substituted, and some of these form efficient gun-flints, or flints for flint and steel.

Flints are said to be found at Coorchycolum in the Trichinopoly district of Madras (*Manual of the Trichinopoly District, p. 67*); in the Dharwar district of Bombay (*Madras Jour. of Lit. and Sci., Vol. XI., p. 46*); in the Bannu district of the Panjáb (*Baden Powell's Pb. Prod., p. 46*; and in Afghánistan immediately across the Kurram (*Records, G. S. I., XII., p. 111*).

Owing to the extensive use of the chalcidonic quartzes in place of the true flint it is difficult to decide whether the mineral reported to be found in the above situations is real flint or not.

USES. 653

Uses of.—Flint when calcined and ground, is used in the manufacture of pottery, and in the natural condition for gun-flints.

Flour, see **Triticum sativum**, *Lamk.*, and **Oryza sativa**, *Linn.*; GRAMINEÆ.

Flower Fence, see **Cæsalpinia pulcherrima**, *Swartz.*, Vol. II., 10.

Flower oil, see **Sesamum indicum**, *D.C.*; PEDALINEÆ.

654

FLUOR-SPAR.

Derbyshire Spar.—This mineral consists of calcic fluoride. Found in India only in very small quantities, probably owing to the small number of metal mines at present worked.

It has been recorded as found at Chicholi in the Raipur district of the ... ate (*Mem., G.* ... *, 166*) ... ion of hydro- ... ix sometimes

Fluoride of calcium, see Fluor-spar.

FLYING-FOX.

655

Flying-fox is the name given by Europeans in India to several

FOOD. 656

MEDICINE. Flesh 657 Fat. 658

FŒNICULUM, *Adans.; Gen. Pl., I., 902.*

A genus of glabrous herbs, belonging to the Natural Order Umbelliferæ, having 3 or 4 species, which are widely distributed, from the Canaries to Western Asia. **F. vulgare** is extensively cultivated.

659

Fœniculum vulgare, *Gærtn.; Fl. Br. Ind., II., 695; Bentley & Trim., Med. Pl., No. 123; Wight, Ic., t. 570;* UMBELLIFERÆ.

THE FENNEL.

Syn.—FŒNICULUM PANMORIUM, *DC., Wight, Ic.;* F. OFFICINALE, *Allion.;* ANETHUM FŒNICULUM, *Linn.;* A. PANMORIUM, *Roxb.;* F. CAPILLACEUM, *Gilib.; Bentley & Trim.;* F. DULCE, *C. Bauh.;* OZODIA FŒNICULACEA, *W. & A., Prodr.*

Vern.—*Saunf, barisaunf, sonp, sont,* HIND.; *Mauri, pan-muhori,* BENG.; *Bari-shopha, panmohuri,* BOMB.; *Variari, wariaree, variyali,* GUZ.; *Badishep,* MAR.; *Badisopu,* KAN.; *Azpa, badyan,* TURKI; *Sohikire,* TAM.; *Pedda-jila-kurra,* TEL.; *Madhurika,* SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 272; Stewart, Pb. Pl., 107; Ainslie, Mat. Ind., I., 129; O'Shaughnessy, Beng. Dispens., 36; U. C.*

FŒNICULUM. vulgare.

Fennel.

Dutt, Mat. Med. Hind., 173; Dymock, Mat. Med. W. Ind., 2nd Ed., 372; S. Arjun, Bomb. Drugs, 64; Murray, Pl. and Drugs, Sind, 197; Irvine, Mat. Med. Patna, 88; Atkinson, Him. Dist., 705, 737; Lisboa, U. Pl. Bomb., 161; Birdwood, Bomb. Pr., 41, 665; Home Dept. Cor., 231.

Habitat.—This perennial attains a height of 5 to 6 feet, and is commonly cultivated throughout India at all altitudes up to 6,000 feet; but is sometimes also found wild. Several cultivated races seem to grow in India, but these do not appear to have been botanically recognised. The seed is smaller and straighter than that of the European fennel, but is otherwise similar.

CULTIVATION. 660

Cultivation.—This plant seems in India generally to be grown only in small patches in homestead lands, as a cold-weather crop. The method of cultivation is that of an ordinary market-garden crop. In Bombay, however, it appears to be cultivated to a larger extent. The following account has been received from the Director of Land Records and Agriculture, dated September, 1889:—"In 1887-88 Fennel occupied 1,454 acres, of which 834 acres were in Khándesh. It is grown in some districts of Gujarat and the Deccan. In the former district it is grown in *gorat*, light soil moderately manured—10 cart-loads to the acre. The land is ploughed, harrowed, and rolled three times between June and October. About 9℔ of seed per acre are scattered by hand into beds, which are irrigated once a fortnight until January. The crop is cut in rather a green state, and allowed to lie in the ground for five days. The acre yield varies from 280 to 1,120℔—720℔ being a good average crop. In the gardens in the Deccan it is sown at any time. It is also sown on the edges of dry crops in July and August. The probable total yearly outturn is estimated at 13,000 maunds, and the price realised varies from R6 to R8 per Indian maund."

CHEMISTRY. 661

Chemistry.—Fennel fruit yields about 3 per cent. of volatile oil, anethol or anise camphor, and a variable proportion of a liquid isomeric with turpentine. Anethol (the constitutent, important medicinally and as a flavouring agent) may be obtained either as a liquid or crystal, as it takes the latter form at a moderately low temperature (*Pharmacographia*, 275).

OIL. 662

Oil.—The fruit contains a volatile OIL, pale yellow, with a pleasant aromatic odour. It is used in Europe in the manufacture of cordials, and enters into the composition of fennel water which is employed medicinally, but chiefly as a vehicle for other drugs. This water is distilled largely in India and sold under the name of *Arak bádián*.

MEDICINE. Fruits. 663 Root. 664 Leaves. 665

Medicine.—The FRUITS are used medicinally as a stimulant, aromatic, and carminative, and are prescribed in colic, diarrhœa, and dysentery. The ROOT is regarded as purgative, and the LEAVES as diuretic.

Besides these properties it is believed, in some parts of the country, that the fruits have a specific value. Thus in Madras they are said to be used as a medicine in venereal diseases.

SPECIAL OPINIONS.—§"Stimulant, aromatic, and carminative in colic" (*Assistant Surgeon Nehal Sing, Saharunpore*). "The infusion of the seeds is used as a cooling drink in fever, &c." (*Civil Surgeon J. H. Thornton, B.A., M.B., Monghyr*). "The seeds fried and powdered are used in dysentery with sugar" (*Assistant Surgeon T. N. Ghose, Meerut*). "Cold infusion of seeds very useful in colic and indigestion of children, and an excellent vehicle for other medicines. Used also to relieve thirst in fever" (*Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces*).

FOOD. Pot-herb. 666 Leaves. 667

Food.—The plant is frequently cultivated as a pot-herb in the plains. Its LEAVES are strongly aromatic and are usedin fish sauces. Roxburgh wrote: "This plant is cultivated in various parts of Bengal during the

Fennel Food and Fodder (*J F Duthie*) FOOD &c

cold season for the seed which the natives eat with their betel, and also use in their curries' Seed time the close of the rains, or about the end of October Harvest time, March

TRADE 668

Trade —The princ pal amount of fennel fruit sent to Bombay is from ... of the fruit in Bombay ... port trade has been ... 82 the total exports ... valued at R31,260 Almost the whole quantity was exported from Bombay in the latter year, *viz*, 4,337 cwt Madras sending 15 cwt and Sind 1 cwt Great Britain received only 221 cwt of this amount, France 975 cwt, Belgium and Austria each 200 cwt, the rest went to Eastern ports

The root is said by Irvine in his *Mat Med of Patna* to be worth R1 8 per lb

669

FOOD, Human.

is put

I Animal food materials
II Mineral " "
III Vegetable " "

670

(*J F Duthie*)

FOOD AND FODDER FOR CATTLE.

in the Appendix

FODDER PLANTS 671

I —FODDER PLANTS OF THE PLAINS

Acacia arabica, *Willd* VERN *Batul* or *kikar* The tender shoots, leaves, and green pods are much liked by cattle, and the tree is greatly valued in regions affected by drought

A Catechu, *Willd* Cattle eat the lower and small branches (*R Thompson*)

A ferruginea *DC* Cattle eat the lower and small branches (*R Thompson*)

A Intsia, *Willd* var cæsia Cattle eat the leaves (*R Thompson*)

A. Jaquemonti, *Benth* A shrub thriving on rocky and sandy soils The branches are cut and the leaves thrashed out and given as fodder

FOOD &

Food and Fodder.

I
FODDER PLANTS OF THE PLAINS

Acacia lenticularis, *Ham.* Cattle eat the leaves and small branches.

A. leucophlœa, *Willd.* Leaves and pods. The latter, however, are considered by some to be poisonous and should be used with caution.

A. modesta, *Wall.* The leaves and fallen blossoms are collected as cattle fodder.

A. Suma, *Kurz.* VERN. *Safed khair.* Leaves and young branches (*R. Thompson*).

Achyranthes aspera, *Linn.* According to Mr. T. N. Mukharji, the young plants are given to cattle in Bengal in times of scarcity.

Adhatoda Vasica, *Nees.* The Conservator of Forests, Northern Circle, Bombay, states that the leaves supply fodder for cattle. This plant is abundant in Northern India, but appears to be there used only as a medicine for cattle for the cure of colic.

Adina cordifolia, *Hook. f.* Leaves (*R. Thompson*).

Ægle Marmelos, *Correa.* Bael tree. Brandis mentions that the twigs and leaves are lopped for cattle fodder.

Ærua javanica, *Juss.* Plant (*R. Thompson*).

Ailanthus excelsa, *Roxb.* Leaves (*R. Thompson*).

Albizzia amara, *Boivin.* Leaves (*R. Thompson*).

A. Lebbek, *Benth.* VERN. *Siris.* In Mysore the leaves of this tree are considered to be good fodder for cattle.

A. odoratissima, *Benth.* The branches are lopped for cattle fodder.

A. procera, *Benth.* Leaves (*R. Thompson*).

A. stipulata, *Boiv.* The branches are lopped for cattle fodder.

Allium Cepa, *Linn.* Boiled onions are given with other food to milch cows and buffaloes in the Nasik District.

Alysicarpus rugosus, *DC.* This and other species are eaten by cows and buffaloes in Bundelkhand.

Amarantus spinosus, *Linn.* This common wayside weed is often given to milch cows in Bengal. Mr. T. N. Mukharji says that chopped up and mixed with the boiled ends of rice-stems, "the preparation is considered highly lactiferous." Other species of Amarantus, many of which are cultivated as pot-herbs, might be substituted with advantage.

Amorphophallus campanulatus, *Bl.* According to Mr. T. N. Mukharji this plant when dead and dry is greedily eaten by cattle in Bengal, and householders occasionally collect it for their cows.

Anogeissus acuminata, *Wall.* } Leaves (*R. Thompson*).
A. latifolia, *Wall* }

A. pendula, *Edgew.* Bhai Sadhu Singh, Forest Officer to the Jeypur State, says that buffaloes and cattle eat the dry leaves of this tree.

Anthocephalus Cadamba, *Benth. & Hk. f.* The leaves are sometimes used as cattle fodder.

Antidesma diandrum, *Roth.* "Cattle eat the leaves" (*Rev. A. Campbell, Chutia Nagpur*).

Arachis hypogæa, *Linn.* The ground-nut is cultivated in many parts of India, especially in the Bombay and Madras Presidencies. The stems and leaves, fresh or dry, are greedily eaten, and the oilcake is an excellent food for fattening cattle and increasing the quantity of their milk.

Argyreia speciosa, *Sweet.* Leaves (*Rev. A. Campbell*).

Artocarpus integrifolia, *Linn.* The leaves of the jack-fruit tree are considered fattening for cattle; and according to Mr. T. N. Mukharji the rind of the ripe fruit is "greedily eaten by cattle as the greatest of luxuries."

A. Lakoocha, *Roxb.* Extensively lopped for cattle fodder (*R. Thompson*).

Atriplex nummularia, *Lindl.* Baron Von Mueller in his *Select Plants,*

p 52 describes this as one of the tallest and most fatten ng and wholesome of the Austral an pastoral salt bushes. Sheep and cattle pastured

I FODDER PLANTS OF THE PLAINS

fodder for cattle in Chut a Nagpur

Balanites Roxburghii *Planch* The young tw gs and leaves are said to be brow sed by cattle

he bark of th s tree

rji the plant is given

t of the mahua tree

are eaten by cattle The flowers are sa d to be very fatten ng

Bauhinia purpurea *Linn* The leaves are lopped for cattle fodder (*Brandis*)

B racemosa *Lamk* The leaves of th s tree are sa d to be eaten by buffaloes in parts of Northern India

B retusa *Roxb*
B Vahlii *W & A*
B variegata *Linn*
The branches of these plants are often lopped for cattle fodder

Bischoffia javanica *Bl* Buffaloes eat the leaves (*R Thompson*)

Bœrhaavia repanda, *Willd* and B diffusa, are both occas onally eaten by cattle and in Bengal the latter is supposed to increase the quant ty of milk Another spec es B verticillata *Poir*, is used in Rajputana as fodder

nd leaves

os ng the by cattle yx of the

unr pe fru t is also g ven to cattle (*T N Mukharj*)

Boswellia serrata *Roxb* Buffaloes eat the leaves (*R Thompson*)

much in the same way as may yield a second crop given to cattle in Bengal product on in Upper Ind a

as green food

B

ist tute a most

locks is weakened and th Sowings commence in Sept

I.
FODDER PLANTS OF THE PLAINS.

ripens in three months. A first-class crop is that which yields a good fodder crop of leaves first and a heavy root-crop afterwards (see *Gas. of Jhang District, p. 111*). In the Gujranwala district turnips are largely grown, often amongst the wheat in the highly-cultivated lands bordering the Chenab, grass being very scarce. A dry season is favourable to a good crop of turnips, and an extension of their cultivation would alleviate one of the worst dangers of a drought, the failure of fodder for cattle (*Gaz. of Gujranwála, p. 54*). In the district of Dera Ismail Khan turnips are grown principally as cattle fodder, and in the Kachi tracts as a head rather than as a root crop. They are extensively cultivated in the Montgomery district, and from the middle of November the crop is used as fodder. In Muzaffargarh they are mostly used as fodder, and ripen just in time to relieve the failing stocks of other kinds of fodder. In the Multan district cattle are fed on turnips from 15th November to the 1st February.

Brassica campestris, *Linn.*, var. **Toria.** Often used as green fodder in the Karnál district (Panjáb).

B. juncea, *H.f. & T.* Sometimes given as green fodder, when other kinds of food are scarce.

Briedelia montana, *Willd.* The leaves are lopped for cattle fodder (*Brandis*).

B. retusa, *Spreng.* The leaves are valued as fodder and the tree is frequently lopped (*Brandis*). Cattle fed on these leaves are said to be cured of worms.

Broussonetia papyrifera, *Vent.* (Paper Mulberry) This valuable fibre plant can be easily cultivated in almost any kind of soil, and the foliage will probably be found to be a useful fodder for cattle.

Buchanania angustifolia, *Roxb.* Buffaloes eat the leaves (*R. Thompson*).

B. latifolia, *Roxb.*—The leaves of this tree are said to be given as fodder in the Savantvadi district, Bombay; and according to Mr. R. Thompson they are similarly employed in the Central Provinces.

Bursera serrata, *Colebr.* Buffaloes eat the leaves (*R. Thompson*).

Butea frondosa, *Roxb.* The *Dhák* tree. Buffaloes are very fond of the leaves, and their milk is said to be improved thereby. They are said to be more wholesome if given when not quite fresh. Camels and goats will not touch this tree.

B. superba, *Roxb.* A large climbing shrub, the leaves of which, according to the Rev. A. Campbell, are eaten by cattle in Chutia Nagpur, and by buffaloes as stated by Mr. R. Thompson.

Buettneria herbacea, *Roxb.* Plant (*R. Thompson*).

Cajanus indicus, *Spreng.* Vern. *Arhar.* Largely cultivated in most parts of India. The leaves and pod-shells are considered excellent feeding for cattle. The husks and broken grain soaked in water are sometimes given to cattle to keep them quiet when being milked.

Calendula officinalis, *Linn.* A weed of cultivation in the Western Panjáb and Sind. It is supposed to increase the flow of milk in cows.

Calotropis gigantea, *R. Br.* In Chutia Nagpur cattle eat the leaves (*Rev. A. Campbell*).

C. procera, *R. Br.* Cattle will eat the dried leaves.

Careya arborea, *Roxb.* The fruit is said to be eaten by cattle in the Kánara district of Bombay.

Carthamus tinctorius, *Linn.* The chaff of this plant is said to be sold as fodder for cattle in the Bulandsharh district. The oil-cake is rather bitter, and is apt to taint the milk.

Cassia Fistula, *Linn.* Vern. *Amaltás.* The twigs and leaves are lopped for cattle fodder in Oudh and Kumaon (*Brandis*).

I FODDER PLANTS OF THE PLAINS

(*Rev A Campbell*), also eaten by buffaloes (*R Thompson*)

Ceratonia Siliqua, *Linn* (The Carob tree) Cattle are fond of the sweet pods and will also browse on the foliage, if allowed to do so Baron Von Mueller states that "in some of the Mediterranean countries horses and stable cattle are almost exclusively fed upon the pods The fattening properties of these pods, which contain about 66 per cent of sugar and gum, are twice those of oil-cake To horses and cattle 6lb a day [illegible] without chaff"

the [illegible] is carefully preserved as cattle food When the grain is thrashed, or trodden out by cattle, the pod shells are separated by winnowing and used as manure or burnt, as they are considered, owing to their sharpness, liable to injure the mouths of cattle

Cistanche tubulosa, *Wight* A curious and rather handsome herb, parasitical on the roots of Ærua javanica and Calligonum polygonoides, and found on sandy ground in parts of the Panjáb and in Sind Stewart, under its synonym Phelipæa Calotropidis, *Walp*, says that the upper portion of the plant is given as fodder to oxen

Citrullus Colocynthis, *Schrad* The fruit is said to be relished by buffaloes

C vulgaris, *Schrad* —(Water-melon) In the Dera Ismail Khan district cattle are sometimes fed on the raw fruit, and the seeds are carefully preserved as cattle food during the winter The seeds are also given to cattle in the Mallání district of Ráj́putana

Clerodendron phlomoides, *Linn f.* } Buffaloes eat the leaves (*R Thomp-*

Cocculus villosus, *DC* Cows and buffaloes eat it (*Roxburgh* under Menispermum hirsutum).

Cochlospermum Gossypium, *DC.* Buffaloes eat the leaves and flowers (*R Thompson*).

Colebrookia oppositifolia, *Smith* Buffaloes are said to be fond of the leaves of this shrub

Colocasia antiquorum, *Schott* In Bengal, according to Mr. T N Mukharji, yams are cut into small pieces and boiled either alone or mixed with rice ends or with portions of Amarantus spinosus, and given to cattle

FOOD & | **Food and Fodder.**

I.
FODDER
PLANTS OF
THE PLAINS.

Combretum ovalifolium, *Roxb.* Buffaloes eat the leaves and young shoots (*R. Thompson*).

Commelina bengalensis, *Linn.* This plant is said by Bhai Sadhu Singh to be given as fodder to cattle in the Jeypur State.

Convolvulus arvensis, *Linn.* Gathered by village children as fodder for cattle (see *Vol. II., p. 519*).

C. pluricaulis, *Chois.* Mentioned by Stewart as being eaten by cattle, and considered cooling.

Corchorus olitorius, *Linn.* (Jute.) Leaves eaten by cattle after the plant is cut for fibre.

Cordia Macleodii, *H. f. & T.* Buffaloes eat the leaves (*R. Thompson*).

C. Myxa, *Linn* The leaves are given to cattle.

C. Rothii, *R. & S.* Buffaloes eat the leaves (*R. Thompson*).

Cratæva religiosa, *Forst.* Buffaloes eat the leaves and fruit (*R. Thompson*).

Crinum, *sp.* The flowers of this (apparently undescribed) species are, according to the Rev. A. Campbell, eaten by cattle.

Crotalaria juncea, *Linn.* (Sunn Hemp.) Cultivated for its fibre, and also, according to Roxburgh, in parts of the Northern Circars as a fodder plant for milch cows. The stems are used as fodder in the Kistna district (Madras), and also in Godaveri, where they are stored in bundles, and covered over with palmyra leaves to protect them from rain. The seeds are also collected and given to cattle in some parts of India.

C. linifolia, *Linn. f.* An annual, common throughout India. Roxburgh says that cattle eat it.

C. medicaginea, *Lamk.* The plant is eaten by cattle in Bundelkhand and Rájputána.

Croton oblongifolius, *Roxb.* Cattle eat the leaves in Chutia Nagpur (*Rev. A. Campbell*).

Cyamopsis psoralioides, *DC.* VERN. *Guár.* Cultivated during the rains in various parts of India. The pods are used as human food, and the seeds are given to cattle and horses; in the former case it is grown as a garden crop, and in the latter as a field crop, being often sown with *bájra*. It is largely grown for cattle in the Meerut Division; also in some of the Panjáb districts in light soils. It is sometimes given green to bullocks.

Cyanotis axillaris, *R. & S.* "Cattle are very fond of this plant" (*Roxburgh*).

C. tuberosa, *R. & S.* Cattle eat the plant (*Rev. A. Campbell*).

Cyperus longus, *Linn.* Mr. T. N. Mukharji says that in Bengal this plant is weeded out from fields and given to cattle.

C. rotundus, *Linn.* VERN. *Mothá.* Cattle eat this plant. Other species of CYPERACEÆ, known under the general name of *dila*, are eaten by cattle, and especially by buffaloes.

Dalbergia lanceolaria, *Linn.* Buffaloes eat the leaves (*R. Thompson*).

D. latifolia, *Roxb.* In Oudh, according to Brandis, the tree is pollarded for cattle fodder. In the Bombay Presidency also it is said to be used for fodder.

D. Sissoo, *Roxb.* (The Shisham tree.) Cattle are fond of the young shoots and leaves, and will browse freely on them if allowed to do so.

D. volubilis, *Roxb.* Cattle eat the leaves in Chutia Nagpur (*Rev. A. Campbell*), and in the Central Provinces (*R. Thompson*).

Daucus Carota, *Linn.* (The Carrot.) A most valuable crop for tracts affected by periodical droughts. Cattle eat both the tops and the roots, and in Kolhápur they are frequently given to milch cows. In Cutch carrots are largely grown both for fodder and for pickling.

I
FODDER PLANTS OF THE PLAINS.

Derris scandens *Benth.* Cattle eat the leaves and pods (*R Thompson*)
Desmodium Cephalotes, *Wall* Cattle eat the leaves of this shrub in Chutia Nagpur (*Rev A Campbell*)
D diffusum, *DC.* "Cattle eat this species greedily, and as it grows quickly and with luxuriance it might be cultivated with advantage" (*Roxburgh* under Hedysarum quadrangulatum)
D parvifolium, *DC* A trailing herbaceous perenn al, common in the plains, it is eaten by cattle and other animals
D pulchellum, *Benth.* Cattle eat the leaves and shoots (*R Thompson*)
D triflorum, *DC* Similar in hab t to the preceding and equally abun- ... "very ... turf ... aron ... inary clover, and as representing a large genus of plants, many of wh ch may prove of value for pasture" Forty-nine species are described in the *Flora of British India*
Dichrostachys cinerea, *W & A* Buffaloes eat the leaves and pods (*R Thompson*)
Digera arvensis, *Forsk* Mainly used as a fodder for cattle in South Baluchistán (*Dr R P Banerji*)
Dillenia aurea, *Smith* Buffaloes eat the young leaves and fruit (*R Thompson*)
D pentagyna, *Roxb* ...
Dioscorea bulbifera, *Lin* ... pur)
D oppositifolia, *Linn*
Diospyros Embryopteris ... es (*R*
D melanoxylon, *Roxb* } *Thompson*)
D. montana, *Roxb* Leaves (*R Thompson*)
Dolichandrone falcata, *Seem* Buffaloes eat the young leaves in the Central ...

is given to cattle, green or dry
D Lablab, *Linn* (Cow gram of Mysore) The leaves and stalks are considered a valuable fodder for milch cows, and the pulse is given to cattle in the Madras Presidency
Dregea volubilis, *Benth.* Cattle eat the leaves in Chutia Nagpur (*Rev A Campbell*)
Ehretia acuminata, *Br* Buffaloes eat the leaves (*R Thompson*).
E lævis, *Roxb* Leaves (*Brandis*)
...
son)
Eriolæna Hookeriana, *W & A* Buffaloes eat the leaves in the Central Provinces (*R Thompson*)
Eruca sativa, *Lamk* Largely used in the Panjáb as a green fodder for cattle, and often specially cultivated for this purpose The oil-cake is also given to cattle
Erycibe paniculata, *Roxb* Buffaloes eat the leaves (*R Thompson*)
Erythrina indica, *Lamk* } Buffaloes eat the leaves (*R Thompson*)
E suberosa, *Roxb* }

FOOD & | Food and Fodder.

I.
FODDER PLANTS OF THE PLAINS.

Eugenia Jambolana, *Lamk.*
E. operculata, *Roxb.*
E. Heyneana, *Wall.* } Buffaloes eat the leaves and fruit (*R. Thompson*).

Euphorbia helioscopia, *Linn.* Cattle eat this plant in Beluchistan (*Dr. R. P. Banerji*).

Farsetia Jacquemontii, *Hk. f. & T.* Eaten by cattle in the Panjáb.

Feronia elephantum, *Correa.* Buffaloes eat the leaves and fruit (*R. Thompson*).

Ficus Cunia, *Buch.* Buffaloes eat the leaves.

F. glomerata, *Roxb.* Leaves and fruit.

F. hispida, *Linn.* Much lopped for cattle fodder (*Brandis*).

F. infectoria, *Roxb.* Leaves (*Brandis*).

F. palmata, *Forsk.* (=F. virgata, *Roxb.*) Leaves.

F. Roxburghii, *Wall.* Leaves (*Brandis*).

F. Rumphii, *Bl.* (=F. cordifolia, *Roxb.*) Leaves (*Brandis*). Buffaloes eat the leaves (*R. Thompson*).

F. saemocarpa, *Miq.* Leaves (*Madden*).

Flacourtia Ramontchi, *L'Hérit.* Leaves (*Brandis*).

F. sepiaria, *Roxb.* Leaves.

Flemingia strobilifera, *R. & Br.* Buffaloes eat the plant in the Central Provinces (*R. Thompson*).

Flueggia Leucopyrus, *Willd.* Buffaloes eat the leaves in the Central Provinces (*R. Thompson*).

Gardenia latifolia, *Ait.* Leaves eaten by cattle in Chutia Nagpur (*Rev. A. Campbell*), and by buffaloes in the Central Provinces (*R. Thompson*).

Garuga pinnata, *Roxb.* Leaves (*R. Thompson*).

Gmelina arborea, *Roxb.* Cattle are fond of the fruit (*Gaz., Kolaba Dist., Bombay, p. 24*).

Gossypium herbaceum, *Linn.* (Cotton.) The seed is a valuable food for milch cattle. The oil-cake is also largely given. In some districts cattle are allowed to graze on the leaves and shoots after the cotton-picking is over.

Grewia lævigata, *Vahl.* Twigs and leaves in North-Western Provinces (*Brandis*).

G. tiliæfolia, *Vahl.* Leaves (*Brandis*).

G. vestita, *Wall.* Leaves.

Guazuma tomentosa, *Kunth.* Leaves valued for fodder in the Bombay Presidency.

Guizotia abyssinica, *Cass.* The oil-cake is much prized for milch cattle.

Hamiltonia suaveolens, *Roxb.* Buffaloes eat the leaves (*R. Thompson*).

Hardwickia binata, *Roxb.* Vern. *Anjan.* "Cattle are exceedingly fond of the leaves. In the Cauvery forests, Northern Mysore, and Berar, the trees were formerly, and are still to a great extent, pollarded for cattle fodder" (*Brandis*).

Helicteres Isora, *Linn.* Buffaloes eat the leaves (*R. Thompson*).

Heterophragma Roxburghii, *DC.* Leaves much eaten by cattle (*Gaz., Thana Dist., p. 27*).

Hibiscus cannabinus, *Linn.* In the Poona district the seed is sometimes given to cattle.

Hippocratea arborea, *Roxb.* Buffaloes eat the leaves (*R. Thompson*).

Hiptage Madablota, *Gærtn.* Leaves (*R. Thompson*).

Holarrhena antidysenterica, *Wall.* Leaves (*R. Thompson*).

Holoptelea integrifolia, *Planch.* (=Ulmus integrifolia, *Roxb.*) "The leaves are lopped for cattle fodder, and the tree is often used to stock fodder for winter supply" (*Brandis*).

Food and Fodder. (*J. F Duthie.*) FODDER.

I FODDER PLANTS OF THE PLAINS.

Holostemma Rheedii, *Wall* Cattle eat the plant in Chutia Nagpur (*Rev. A Campbell*)
Hymenodictyon excelsum, *Wall* Leaves.
B ffaloes are fond of this plant
ı Bengal,

s of wild indigo are highly nitrogenous
I. paucifolia, *Del.* Plant
I. pulchella, *Roxb.* Cattle eat the leaves in Chutia Nagpur (*Rev A. Campbell*)
Ipomæa aquatica, *Forsk* VERN. *Kalmi.* "This plant is given to cattle in Bengal dried and smoked like *nár* grass, and is considered lactiferous" (*T N Mukharji*)
I. Batatas, *Lamk.* (Sweet potato) The stems are considered excellent fodder for cattle.
Ixora parviflora, *Vahl.* Buffaloes eat the leaves in the Central Provinces (*R Thompson*)
Kydia calycina, *Roxb* Buffaloes eat the leaves in the Central Provinces (*R Thompson*)
Kyllingia monocephala, *Linn* The plants are given to cattle in Bengal (*T N Mukharji*)
Lagenaria vulgaris, *Seringe.* (Bottle-gourd) In Bengal the fruit chopped up with rice-ends (*khud*) is often given to milch cows In the Kolhapur district of Bombay the fruit when grown in abundance is chopped up and given to buffaloes.
Lagerstrœmia parviflora, *Roxb* Buffaloes eat the leaves (*R. Thompson*)
Lathyrus Aphaca, *Linn* A cold-season weed of cultivated ground in
as fodder to cattle
L.
L.

ripen its seed
Lens esculenta, *Mœnch* (Lentil) The dry stalks and leaves are sometimes given to cattle, though considered by some to be a heating form of food.
Lepidium Draba, *Linn.* A common wayside weed at Quetta. Judging
fodder for cattle and other

ıgal,
fed,

aves

are

I. FODDER PLANTS OF THE PLAINS.

(*T. N. Mukharji*). In dry seasons buffaloes eat the leaves (*R. Thompson*).

Marsdenia tenacissima, *W. & A.* Buffaloes eat the leaves (*R. Thompson*).

Medicago denticulata, *Willd.* A cold-season weed, largely used as green fodder in the Panjáb, and considered good for milch cows.

M. lupulina, *L* (Hop-trefoil) A cold-season weed of Northern India often collected for fodder, and worthy of cultivation in the Panjáb. Sutton, in his "Permanent and Temporary Pastures," p. 71, says that the herbage is more nutritious than that of Red clover, and helps to make a good bottom to a pasture, and that it is supposed to impart colour and good flavour to butter.

M. sativa, *Linn.* Lucerne is now well known all over India as a very valuable green fodder crop, especially for horses. It should be given, however, only as a supplement to the ordinary food, as animals will always suffer if allowed to eat as much of it as they will. Mixed with the chopped straw of oats, barley, or wheat, it forms a very wholesome feed. For further information see the article on **Lucerne** under **Medicago**.

Melia Azadirachta, *Linn.* (The Neem tree.)
M. Azedarach, *Linn.* (Persian Lilac.)
} The leaves are said to be given as fodder to cattle in the Ahmednagar district of Bombay.

Melilotus parviflora, *Desf.* Very common in Northern India as a cold-season weed of cultivation, and largely used in the Panjáb as green fodder for cattle. It is said to be cultivated in some districts for this purpose. An allied species with white flowers (**M. alba**, *Lamk.*) has been known to give colic to cattle; but all plants, especially of the clover kind, if eaten in excess in the green state, are liable to cause this complaint.

Miliusa velutina, *Hk. f. & T.* VERN. *Dom-sál.* Buffaloes eat the leaves (*R. Thompson*).

Millettia auriculata, *Baker.* This climber is extensively lopped to afford fodder to buffaloes (*R. Thompson*).

Mimusops hexandra, *Roxb.* VERN. *Khirni.* Buffaloes eat the leaves in the Central Provinces (*R. Thompson*).

Morinda tinctoria, *Roxb.* VERN. *Ál.* In the Rewa Kántha district of Bombay, the leaves are given to cattle when grass and forage are scarce.

Morus indica, *Linn* The leaves are said to be a good fodder for cattle.

Musa paradisiaca, *Linn.* (The Plantain.) Chopped into small pieces it is largely used as fodder in many parts of India, and according to Mr. T. N. Mukharji it forms the staple food of cattle in parts of the Hughli district. It cannot, however, be very nutritious, and is apt to cause diarrhœa. Mr. Mukharji also says that the white portion of the root is chopped fine and given to cattle, and is a more substantial food than the stems. Cattle are very fond, too, of the skin of the fruit, and the flowers when available.

Nyctanthes Arbor-tristis, *Linn.* VERN. *Harsinghar.* Buffaloes eat the young leaves (*R. Thompson*).

Ochna squarrosa, *Roxb.* Buffaloes eat the leaves in the Central Provinces (*R. Thompson*).

Ocimum canum, *Sims.* Cattle eat the leaves in Chutia Nágpur (*Rev. A. Campbell*).

Odina Wodier, *Roxb.* This tree is often lopped and pollarded, the leaves and branches being a favourite fodder of cattle (*Brandis*).

Olea cuspidata, *Wall.* The leaves are said to be good fodder for cows and milch buffaloes (*Gaz., Rawal Pindi, p. 80*).

Opuntia Dillenii, *Haworth.* (Prickly Pear.) This is the kind which grows so plentifully in Southern India, and were it not for the spines it might be used with advantage as a profitable adjunct to the ordinary food of cattle,

I FODDER PLANTS OF THE PLAINS

especially in times of scarcity Dr Shortt (*Indian Forester, Vol III* ... Thomas, then Col- ... possible to preserve ... ked with grass was pronounced by Mr Hooper to be wholesome food for cattle (See *Bulletin of Useful Information, Royal Gardens, Kew, 1888, p 173*)

Ougeinia dalbergioides, *Benth.* The branches are often lopped for cattle fodder

Oxalis corniculata, *Linn* Cattle eat this plant in Chutia Nagpur (*Rev A Campbell*)

Pæderia fœtida, *Linn* [*Jour Agri Hort Soc Ind, VII, 224* In the publication referred to, it is stated that this climber is greedily eaten by elephants —*Ed*]

... Bengal, ... s in the ... en given ... wever, to ... d leaves, ... ening for ... with *ghi* ... ore it is looked upon as useless In the Panjáb, however, it is thought highly of, though valued less than that of *moth* and *urd*

P. Mungo, *Linn*, var radiatus VERN *Urd* The grain of this is also given as a fattening food to cattle Roxburgh says that cattle eat the straw, and that it is considered nourishing In Mysore it is thought to be harmful to cattle, and is therefore used as manure, or for feeding ... called *khalela*, and the refuse of the distilleries is eagerly eaten by them

Phyllanthus Emblica, *Linn* VERN. *Amla* Buffaloes eat the leaves and fruits (*R Thompson*)

P. urinaria, *Linn*. Roxburgh says that cattle eat this herb

Piptadenia oudhensis, *Brand*. The tree is pollarded for cattle fodder (*Brandis*).

Pisum sativum, *Linn* (Common Pea) In many parts of the Panjab this, and probably also the Field Pea (P arvense, *Linn*), is grown ...

Pi... ... lities ... the

Polyalthia cerasoides, *Benth. & Hk f.* ⎫ Buffaloes eat the leaves in the
P suberosa, *Benth. & Hk f* ⎭ Central Provinces (*R Thompson*)

I. FODDER PLANTS OF THE PLAINS

Polygonum barbatum, *Linn.* } Roxburgh says that cattle are fond of
P. chinense, *Linn.* } these plants.
P. tomentosum, *Willd.* Cattle eat it greedily (*Roxburgh*).
Pongamia glabra, *Vent.* (Indian Beech.) Cattle are said to be fond of the leaves of this tree. It is almost evergreen, and is much used for planting along road-sides. Grass grows well under its shade.
Populus euphratica, *Oliv.* } The leaves afford fodder for cattle, and the
P. nigra, *Linn.* } tree is lopped occasionally for that purpose (*Brandis*).
Portulaca oleracea, *Linn.* Cattle eat this herb in Chutia Nagpur (*Rev. A. Campbell*).
Premna integrifolia, *Linn.* } The leaves are a good fodder for cattle
P. latifolia, *Roxb.* } (*Brandis*).
Prosopis juliflora, *Benth.* (Mesquite Bean.) Introduced from Texas. The sweet pods are much liked by cattle. It thrives well in Upper India even on poor soils.
P. spicigera, *Linn.* VERN. *Jand.* The pods are eaten by cattle. Though not so nutritious as the fresh pods of the *babul*, they can be kept good longer.
Psoralea corylifolia, *Linn.* The plant is eaten by cattle in Bundelkhand.
Pterocarpus Marsupium, *Roxb.* (Bastard Teak.) The leaves are a favourite food of cattle.
Pueraria tuberosa, *DC.* The leaves are considered to be good fodder for cattle.
Putranjiva Roxburghii, *Wall.* The leaves are lopped for cattle fodder (*Brandis*).
Randia dumetorum, *Lamk.* The leaves are lopped and used as cattle fodder (*Brandis*).
R. uliginosa, *DC.* The leaves are browsed by cattle (*Brandis*).
Raphanus sativus, *Linn.* (Radish.) The oil-cake, although much liked, is given to cattle only in certain parts of Northern Bengal (*T. N. Mukharji*).
Rhizophora mucronata, *Lamk.* The leaves of the Mangrove tree are largely used in Kâthiawar to feed cattle, and the berries are said to increase their milk-giving powers. In the Kistna district of Madras cattle eat the dried leaves.
Ricinus communis, *Linn.* (Castor.) The oil-cake is given to cattle in Sind, according to Stocks. In Bengal it is used as manure (*T. N. Mukharji*).
Saccopelatum tomentosum, *Hk. f. & T.* The leaves are used as cattle fodder.
Salix acmophylla, *Boiss.* About Quetta the tree is much lopped for cattle fodder (*Brandis*).
S. tetrasperma, *Roxb.* The tree is often lopped for cattle fodder (*Brandis*).
Salvadora oleoides, *Dcne.* VERN. *Jál.* The fruit is said to be eaten by cattle of the highlands of the Rohtak district.
Sapindus Mukorossi, *Gærtn.* The leaves are given as fodder to cattle (*Brandis*).
Schleichera trijuga, *Willd.* In Oudh this tree is lopped, and the twigs and leaves are used as cattle fodder. Mr. Smythies says that the fruit also is eaten by cattle.
Scirpus barbatus, *Roxb.* The plant is used as fodder for cattle in the Jeypur State (*Bhai Sádhu Singh*).
S. maritimus, *Linn.* Fair forage for cattle.
Sesamum indicum, *DC.* (Gingelly or Til.) The oil-cake is a fattening food for milch cattle, and by those who can afford it is often given to

hard working oxen The empty capsules are also given to cattle In the Baroda State bruised sesamum is given mixed with bruised gram

Sesbania ægyptiaca, *Pers* VERN *Jait* Cattle are very fond of the foliage

S

Sh

I FODDER PLANTS OF THE PLAINS.

Smithia sensitiva *Ait* Makes excellent hay (*Roxburgh*)

Sonchus oleraceus, *Linn* Cattle are fond of this plant

Soymida febrifuga, *A Juss* Buffaloes eat the young leaves in the Central Provinces (*R Thompson*)

Spondias mangifera, *Pers* (Hog Plum) Cattle eat the leaves (*R Thompson*) and according to Mr Smythies, the fruit

Stereospermum chelonoides, *DC*
S suaveolens, *DC*
S xylocarpum *Wight*
} Buffaloes eat the young leaves (*R Thompson*)

Stephegyne parvifolia *Korth* VERN *Kaddam* Cattle eat the leaves

Sterculia colorata, *Roxb* Twigs and leaves lopped for cattle fodder (*Brandis*)

S villosa, *Roxb* The leaves are given to cattle in the Savantvádi district of Bombay

Streblus asper, *Lour.* The leaves are lopped extensively for cattle fodder (*Brandis*)

Strobilanthes callosus, *Nees* VERN *Karvi* (Bombay) This shrub flowers profusely about every eight or nine years, and then becomes covered with a sticky exudation (*mel*) Herds of cattle gather from all sides to feed on it (*Gaz*, *Thana district*, *p* 43) This plant is abundant on Mount Abu, where it flowered abundantly in 1887

Symphytum peregrinum, *Ledeb* (Prickly Comfrey) Yields excellent

Tephrosia purpurea *Pers* Cattle feed on t s p a t

Terminalia Arjuna *Bedd* Cattle eat the leaves in Chut a Nagpur (*Rev A Campbell*), and the young leaves are eaten by buffaloes (*R Thompson*)

T belerica, *Roxb* VERN *Bahera* In the Kángra district the leaves are cons dered to be the best fodder for milch cows

T Chebula *Retz* VERN *Harar* Cattle are said to eat the leaves of this tree

T tomentosa, *W & A* The leaves are lopped for cattle fodder (*Brandis*)

Thespesia Lampas, *Dalz & Gibs* Buffaloes eat the leaves in the Central Provinces (*R Thompson*)

Tiliacora racemosa, *Colebr* Buffaloes eat the leaves in Oudh (*R Thompson*)

Tinospora cordifolia, *Miers* VERN *Golancha* This twining plant

FOOD &

Food and Fodder.

I
FODDER PLANTS OF THE PLAINS.

Trewia nudiflora, *Linn.* Buffaloes eat the leaves in Oudh (*R. Thompson*).
Trianthema pentandra, *Linn.* Eaten by cattle.
Trigonella Fœnum-græcum, *Linn.* (Fenugreek.) Is grown extensively in the Panjáb, where it is used chiefly as a green fodder for cattle. It yields only one cutting.
Turpinia pomifera, *DC.* The leaves are used as fodder.
Vangueria spinosa, *Roxb.* The leaves are said to be a useful fodder in the Thána district of Bombay.
Ventilago calyculata, *Tulasne.* Buffaloes eat the leaves in the Central Provinces (*R. Thompson*).
Vicia Faba, *L.* VERN. *Bikla.* The seeds are sometimes given to cattle.
V. hirsuta, *Koch.* Cultivated locally for cattle fodder.
Vicoa auriculata, *Cass.* Buffaloes are said to be fond of this plant.
Vigna Catiang, *Endl.* VERN. *Lobiya.* The leaves and stems are sometimes used as cattle fodder. In Mysore the straw is said to be useful only as manure.
V. pilosa, *Baker.* The straw of this plant is said to be used as a cattle fodder.
V. vexillata, *Benth.* Cattle eat the plant in Chutia Nagpur (*Rev. A. Campbell*).
Vitex leucoxylon, *Linn. f.* Buffaloes eat the leaves in the Central Provinces (*R. Thompson*).
Wendlandia exserta, *DC.* Cattle eat the leaves (*R. Thompson*).
Woodfordia floribunda, *Salisb.* Cattle eat the leaves in Chutia Nagpur (*Rev. A. Campbell*).
Wrightia tinctoria, *R. M.* Leaves eaten by buffaloes and other cattle in the Jeypore State (*Bhai Sádhu Singh*), and by buffaloes in the Central Provinces (*R Thompson*).
W. tomentosa, *R. & S.* Cattle eat the leaves in Chutia Nagpur (*Rev. A. Campbell*). Leaves eaten by buffaloes in Central Provinces (*R. Thompson*).
Xylia dolabriformis, *Benth.* Buffaloes eat the leaves in the Central Provinces (*R. Thompson*).
Zizyphus Jujuba, *Lamk.* VERN. *Ber.* The leaves are much valued as cattle fodder.
Z. nummularia, *W. & A.* VERN. *Jhárberi.* Cattle are largely fed on the leaves of this bush in many parts of India, and it is often a most useful stand-by when other sources of fodder fail.
Z. rugosa, *Lamk.* Cattle eat the leaves in Chutia Nagpur (*Rev. A. Campbell*).
Z. xylopyra, *Willd.* VERN. *Katber.* The young shoots, leaves, and fruit serve as fodder for cattle (*Brandis*).

II.
INDIAN FODDER GRASSES.
672

II. INDIAN FODDER GRASS—EXCLUDING HIMÁLAYAN SPECIES.

Æluropus littoralis, *Parl.*, var. repens. Sandy and saline tracts in the Western Panjáb, resembling *dúb* (Cynodon Dactylon), which it replaces.
Alopecurus pratensis, *Linn.* (Meadow Fox-tail.) A common European grass occurring also on the Himálaya and descending to the Panjáb plains. Abundant at Quetta, where it is largely used for feeding horses. Might be cultivated with advantage as a winter grass in many parts of the Panjáb.
Andropogon annulatus, *Forsk.* An abundant and excellent fodder grass. A variety with the outer glumes 3-toothed, A. Bladhii, *Retz.*, is also plentiful.

Food and Fodder. (*J F Duthie*)

FODDER

INDIAN FODDER GRASS.

Andropogon caricosus, *Linn* Plentiful in Bundelkhand and the Central Provinces, and largely used as fodder

A foveolatus, *Del* Abundant on sandy and stony ground, and generally considered to be a good fodder grass

A Ischæmum, *Linn* A good fodder grass resembling **A annulatus**, but less abundant

A. laniger, *Desf.* Common in North Western India. Cattle eat this grass readily when it is young and tender, but horses are liable to suffer from colic after feeding on it It is strongly aromatic, and the scent is often communicated to the milk of cows

A micranthus, *Kunth*, var **villosulus** (*Hack Mongr*, *490*) On Mount Abu, where it is called *Ballak*, and is much valued for fodder It occurs also on the Himálaya

A muricatus, *Rets* (**A. squarrosus**, *Linn f* in *Hack Mongr*, *542*) This is the *khos khas* grass the roots of which are employed in making tatties It thrives best on damp low lying land, where, when young, it affords abundance of fodder for buffaloes and in seasons of excessive [illegible]

A [illegible] Central India on black soil, also on [illegible] ass for cattle, but not for horses

A pertusus, *Willd* VERN *Palwa* An excellent grass for grazing [illegible]

A [illegible] undant in Northern and [illegible] ler it is not considered [illegible] the roofing portion of the stacked hay The essential oil, *rusa ka tel*, is supposed to exercise [illegible]

[illegible]

Apluda aristata, *Linn* (**A varia** *Hack*, var **aristata**) Abundant in India amongst bushes, and in forest land often forms a large portion of the undergrowth Considered to be good fodder when young

Aristida depressa, *Rets* Abundant on sandy and stony ground, where it affords good grazing when young

A hystrix, *Linn f.* Met with in similar situations, and probably of equal value

Arthraxon lanceolatus, *Hochst* (**Andropogon lanceolatus**, *Roxb*) Common on rocky ground, and said to be a good fodder grass in Rájputana

Avena sativa, *Linn* (Oats) First-rate fodder, both green and as hay, especially for horses

Bambusa arundinacea, *Retz* A favourite fodder of elephants The leaves are given to horses as a medicine

Bromus unioloides, *H B & K.* (Prairie-grass of Australia) Much valued both in Australia and America as a nutritious fodder grass, whether green or dry Has been tried in India, but as a crop was found inferior to oats

Cenchrus catharticus, *Del* VERN *Bhurt* A characteristic desert grass, and much valued for grazing purposes on account of the early appearance of its foliage

FOOD & | **Food and Fodder.**

II. INDIAN FODDER GRASS.

Cenchrus montanus, *Nees.* VERN. *Anjan.* Flourishes on sandy soils. Very good for grazing and makes excellent hay.

C. penniseliformis, *Hochst. & Steud.* A tall succulent grass, growing in bushy places and often assuming a climbing habit.

Chloris barbata, *Swartz.* Considered good for cattle up to the time of flowering.

C. digitata, *Steud.* Amongst bushes and under the shade of trees. Is used as fodder in Rájputana.

C. tenella, *Roxb.* Said to be a good fodder grass in Rájputana.

C. tetrastachys, *Hack. MS.* Apparently confined to the saline usar tracts of the North-Western Provinces, where over considerable areas it constitutes the only vegetation.

Chrysopogon serrulatus, *Trin.* (Andropogon Trinii, *Steud.* in *Hack. Monogr.*) Common in hilly parts of India, a very good fodder grass, and much liked by horses.

Coix lachryma, *Linn.* Largely eaten by cattle in Oudh, and said to be very fattening.

Cynodon Dactylon, *Pers.* VERN. *Dúb.* Universally recognised to be the most nutritious and useful fodder grass in this country, whether green or dry, especially for horses.

Dendrocalamus strictus, *Nees.* Affords abundant fodder for elephants.

Dinebra arabica, *Beauv.* Plentiful in Central India on cultivated ground.

Diplachne fusca, *Beauv.* Common on low-lying ground, especially where the soil is saline. Buffaloes appear to be very fond of it.

Eleusine ægyptiaca, *Pers.* VERN. *Makra.* A common grass, especially on cultivated ground. Said to be very good for cattle, but not for horses.

E. Coracana, *Gærtn.* VERN. *Mandua* or *ragi.* Cultivated as a grain crop in most parts of India, and largely so in Mysore, where it affords abundance of fodder, both green and as straw. Ragi straw is there considered to be the best fodder for cattle, which are said to work and thrive on it alone, without requiring grass. Horses also are sometimes fed on it when grass is scarce. It is said to improve by keeping.

E. flagellifera, *Nees.* VERN. *Chhimbar.* A nutritious perennial species resembling *dúb*, common on sandy ground. In Bikanir it is said to be the best grass for cattle and sheep.

E. indica, *Gærtn.* Rather a coarse grass, though liked both by horses and cattle.

E. scindica, *Duthie.* Like a slender form of *makra.* Said to be a good fodder grass. Found on sandy ground.

E. verticillata, *Roxb.* Considered to be a good fodder grass in the Panjáb and Rájputana.

Elionurus hirsutus, *Munro.* (Rottbœllia hirsuta, *Vahl.* in *Hack. Monogr.*) A characteristic desert grass affording excellent grazing when young. Said to be liked by elephants.

Eragrostis abyssinica. Introduced from Abyssinia, where it is grown as a cereal under the name of *Teff.* Affords excellent green fodder.

E. bifaria, *W. & A.* Common on sandy and rocky ground. Eaten by cattle in Rájputana.

E. Brownei, *Nees.* Wet ground. Valued as fodder in Australia.

E. ciliaris, *Link.* Sandy ground, good for grazing.

E. cynosuroides, *R. & S.* VERN. *Dúb.* A coarse deeply-rooting grass frequent on low-lying waste lands. It is much liked by buffaloes.

E. elegantula, *Nees.* Frequent on wet ground. Eaten by cattle.

E. megastachya, *Link.* Used as fodder.

E nutans, *Nees.* Plentiful on damp clay soils. Cattle readily eat it when other grasses fail.

Food and Fodder. (J F Duthie) FODDER

II. INDIAN FODDER GRASS.

Eragrostis pilosa, *Beauv* Relished by buffaloes

E plumosa, *Link* A fairly good fodder grass varying according to the soil A dwarf variety with denser flowering spikes is abundant on sandy and saline tracts

E tenella *Beauv* Common on cultivated ground It is eaten by cattle both when fresh and as hay, and the seeds which it bears in profusion are said to render it all the more nutritious

Eriochloa annulata, *Kunth* Grows in wet places In Australia it is said to be much relished by stock

Euchlæna luxurians, *Ascher* (*Teosinte*) A native of Guatemala A quick-growing nutritious annual, but too expensive to cultivate for fodder on a large scale

Hemarthria compressa, *Kunth* (Rottbœllia compressa, *Linn f* in *Hack Monogr*) Cattle are fond of this grass Is said to be highly esteemed in Australia for moist pastures

Heteropogon contortus, *R* [illegible] *Linn* in *Hack Monogr*) [illegible] feet on the Himalaya [illegible] the spears have fallen [illegible] stacked after the rains [illegible] splendid grass for a cattle run

Hordeum vulgare *Linn* (Barley) The grain is often given to horses, and [illegible]

[illegible] grass It is found usually on wet ground

Ischæmum angustifolium, *Hack* (Pollinia eriopoda, *Hance*) VERN *Bhábar* Eaten by cattle when young

I ciliare, *Retz.* Common in Central India, and occasionally used as a fodder grass

I laxum, *R Br* VERN *Sairan* (Rájputana), *Sira* (C Prov) Abundant in Rájputana and the Central Provinces, where it is much valued for fodder.

I pilosum, *Hack* A common black soil grass and considered to be good for fodder

I rugosum, *Salisb* Found on wet ground and in paddy fields and in its young state is hardly distinguishable from rice Cattle and horses eat it when young

Is[illegible] India, usually [illegible] grass and in [illegible] for fodder [illegible] parently not [illegible]

II. INDIAN FODDER GRASS.

Manisuris granularis, *Swartz*. According to Coldstream it is prized and stacked at Hissar, but is not much relished by cattle, though at Ajmere it is considered to be a good fodder grass.

Melanocenchris Royleana, *Nees*. Common on sandy ground, and said to afford good grazing when young. It is, however, too small to be of much account.

Ophiurus corymbosus, *Gærtn*. A common black-soil grass, eaten by cattle when young, or when other grasses fail.

O. perforatus, *Linn*. Found on low-lying pastures. Cattle eat it when it is young and green.

Oplismenus Burmanni, *Retz*. Found usually in shady places. Cattle eat it when young, and it is said to make good hay.

Oryza sativa, *Linn*. (Rice.) Rice-straw is the chief fodder in the Madras Presidency, and is stacked in every district. It is usually kept for a few months to season, and will remain good for three years. It is also very largely used as fodder in Bengal and parts of the Bombay Presidency. In Northern India it is less valued. The young shoots after the rice has been harvested afford good pasturage for sheep in the Ratnagiri district. The husks mixed with oilcake are sometimes given to buffaloes. In Burma and Manipur unhusked rice is frequently given to horses.

Panicum antidotale, *Retz*. VERN. *Ghamur*. A tall coarse-looking grass found in clumps, and often associated with other herbage which, like itself, seeks shelter under prickly bushes. Wingate says that more than three fourths of the grass growing in the Changa Manga plantation consists of this species, and that the natives feed their cattle on the green fodder. In the Sirsa Settlement Report it is stated that cattle are apt to be poisoned if they eat it green. At Hissar, however, according to Coldstream, it is grazed only when young, as it afterwards acquires a bitter and saltish taste.

P. colonum, *Linn*. VERN. *Sawánk*. A common weed on cultivated land. Is greedily eaten by all kinds of cattle, both before and after it has flowered, the abundant crop of grain yielded by it adding materially to its nutritive value. Aitchison says that it is sometimes cultivated at Jhelum.

P. Crus-Galii, *Linn*. VERN. *Sánwak*. A coarser plant than the preceding, and usually found near water. Is said to be cultivated in the Lahore district. Cattle, especially buffaloes, are fond of it. In America, where it is known as Barn-yard grass, it is said to be much liked by horses, both when green and dry.

P. distachyum, *Linn*. Common in Northern India. In Australia this species is grown for hay, and is said to be an immense yielder.

P. erucæforme, *Sibth. & Sm*. Common on black and sandy soils in Bundelkhund and Central India, especially on cultivated ground. Yields an abundance of grain.

P. flavidum, *Retz*. Plentiful in the plains, and much liked by cattle and horses. It yields an abundance of grain which contains twice as much oil or fat as that of any other species examined by Professor A. H. Church.

P. fluitans, *Retz*. A water-grass. An abundant grain-yielder.

P. frumentaceum, *Roxb*. VERN. *Sánwan*. Grown as a rainy-season crop chiefly for its grain, but occasionally for fodder. The straw is a good fodder and is much used in parts of Mysore and in the Madras Presidency, though ranked below that of *ragi* and rice.

P. helopus, *Trin*. VERN. *Kurí*. Considered to be a very good fodder grass for horses and cattle. It is a common weed of cultivated ground in the plains, and is found also on the Himálaya at moderate elevations.

II. INDIAN FODDER GRASS.

Panicum humile, *Nees.* Common in Central India, where it is used as fodder.

P. jumentorum, *Pers.* (Guinea Grass) A very valuable fodder plant, easily cultivated in the plains, and capable of yielding seven or eight cuttings during the year under irrigation. A single cutting will yield as much as 180 maunds of green fodder. All kinds of stock will thrive on it

P.

P.

are fond of the straw.

P. Petiveri, *Trin.* A fairly good fodder grass, but said to be unsuited for hay.

P. prostratum, *Lamk.* A good fodder grass and a heavy seed-yielder.

P. psilopodium, *Trin* VERN. *Mijhri.* Resembles *Kutki* (P. miliare), and is cultivated and utilised in the same manner

P. repens, *Linn* A perennial glaucous species occurring in swampy ground. Both Roxburgh and Royle state that cattle are fond of this grass

P. sanguinale, *Linn.* VERN *Takri.* Common all over the plains, and up to moderate elevations on the Himálaya It is largely used as fodder. In America it is known as Crab-grass, and is much valued for pasture as well as hay. A variety with hairy glumes (P. ciliare, *Retz.*) is also common, particularly on dry sandy soils, and is largely used for fodder.

Paspalum Kora, *Willd* Common on wet ground, and eaten by buffaloes

P. scrobiculatum, *Linn* VERN. *Koda* A rainy-season crop yielding a coarse kind of grain used mostly by the poorer classes of people. Cattle should be prevented straying into the fields when this crop is ripening, as the grain, until it has been washed several times, is most

... grass is largely

West Panjáb ... The foliage is very

...-soil grass. Affords

S

S.

the sides of rivers and on low-lying ground. It is much relished by buffaloes, and when young is given to elephants In the Rohtak district of the Panjáb it is considered good fodder for horses

II. INDIAN FODDER GRASS.

Setaria glauca, *Beauv.* VERN. *Bandra.* Very common, especially in damp ground. A moderately good fodder, but unsuited for hay.

S. italica, *Beauv.* VERN. *Kangni.* Cultivated for its grain. In parts of Mysore the straw is reckoned as next in quality to that of *ragi*. In the Montgomery district the *bhusa* is considered a strengthening food. It is known in the United States as "Hungarian grass" and is much valued as forage; also in Australia.

S. verticillata, *Beauv.* A coarse grass common in shady places. Cattle eat it when young.

Sorghum halepense, *Pers.* (Andropogon Sorghum, *Brot.*, var. halepensis in *Hack. Monogr.*). VERN. *Baru.* Said to be good for grazing and for hay, but not considered wholesome until after the rains are over. Opinions, however, are at variance on this point. In Australia it is much valued for pasturage and hay, also in the United States, where it is called "Johnson grass."

S. saccharatum, *Pers.* (Andropogon Sorghum, *Brot.*, var. saccharatus in *Hack. Monogr.*) Two varieties were introduced into India about 30 years ago, one called *Sorgho*, from China, and the other from Africa, called *Imphi*. *Sorgho* has taller stems and looser panicles of flowers. It is cultivated in tropical countries for its grain, and in temperate regions for fodder and sugar. The Chinese grow it chiefly for making alcohol. As a fodder plant it is greatly valued. It was first tried in India in 1858, and the result of the experiment showed that though it could not be compared with the ordinary sugarcane of the country as a sugar-yielder, it would prove of great value as a forage plant. Subsequent trials undertaken chiefly in South India, have confirmed this opinion. The Chief Commissioner of Mysore in his report for 1871 observes:—"With respect to the value of *Sorgho* as an article of fodder, there appears to be no doubt that it will grow fairly in this province as a dry crop, *i.e.*, on land not irrigated during the rainy season, and that if cut for fodder before seeding, it is well suited for cattle, especially milch cows, their milk being enriched to an extraordinary degree by its use in small quantities." Mr. Phillips' experiments with *Sorgho* at Allahabad in the years 1872, 1873, 1874 gave some wonderful results in the way of yield and profit. The United States Agricultural Department has declared that the value of *Sorgho* for feeding stock cannot be surpassed by any other crop, as a greater amount of nutritious fodder can be obtained from it in a shorter time, within a given space, and more cheaply. The African *Imphi* is a smaller plant, and though on this account less profitable as a crop it appears to be equally nutritious.

S. vulgare, *Pers.* (Andropogon Sorghum, *Brot.*, in *Hack. Monogr.*) VERN. *Judr.* Yields excellent fodder, green or dry, which is largely used in various parts of India. It is often specially grown as a fodder crop under the name of *chari*; in which case it is sown earlier and more thickly than when cultivated for the grain. The stalks of certain juicy varieties afford valuable feeding for milch cattle. The chopped-up straw (*karbi*) is much used as cattle food in Northern India. In the Madras Presidency the straw is less valued than that of *ragi*, but is considered superior to that of rice.

Sporobolus diander, *Beauv.* Said to be eaten by horses and cattle.

S. indicus, *R. Br.* A good pasture grass for horses, also given as fodder when young.

S. pallidus, *Nees.* VERN. *Palengi.* A gregarious species common in moist sandy ground, and affording a considerable amount of forage. A variety called *kálusra* constitutes the greater part of the grass vege-

tation of the *usar* tracts in the North-Western Provinces, and is always a sure indication of the presence of *reh* salts

II. INDIAN FODDER GRASS.

Tetrapogon tetrastachys, *Hack* (*MS*). A characteristic usar grass accompanying Sporobolus pallidus, var, and often constituting the entire vegetation

[illegible] —na species, said to be

[illegible] According to Cold- [illegible] nutritious, but is too

[illegible] India green wheat is [illegible] sheep and goats are allowed to graze on the wheat crops once in order to strengthen the stalks and prevent their being laid by wind The straw is often given as fodder, but in Mysore it is said to cause distemper. The chaff or *bhúsa* is a well known form of food. It is sometimes mixed with gram chaff to render it more wholesome.

Zea Mays, *Linn* (Maize or Indian Corn) Often given as green fodder, or dried and mixed with other green fodder.

III. HIMALAYAN FODDER PLANTS—EXCLUDING GRASSES

III.

[illegible]

finest pasture lands of Great Britain and the Continent of Europe.

Abelia triflora, *R. Br.*, CAPRIFOLIACEÆ. Temperate region. Browsed by goats

Abies Webbiana, *Lindl.*, CONIFERÆ. Temperate region On the Panjáb Himálaya the twigs and leaves are cut and stored for use in winter.

Acer pictum, *Thunb*, and **A. villosum**, *Wall*, SAPINDACEÆ. Temperate region. The branches are lopped for fodder.

Achillea millefolium, *Linn.*; COMPOSITÆ Temperate and Alpine re- [illegible]

given to horses and mules

Allardia glabra, *Dcne.*; COMPOSITÆ. Alpine region. A perennial herb, browsed by sheep and goats.

Alnus nitida, *Endl.*; CUPULIFERÆ. Temperate region. The leaves are used as fodder.

[illegible] e region. The leaves

[illegible] ate region A peren-

[illegible] Eaten by sheep.

[illegible] mperate and Alpine regions. A shrub occasionally eaten by cattle.

II.
INDIAN
FODDER
GRASS.

Setaria glauca, *Beauv.* VERN. *Bandra.* Very common, especially in damp ground. A moderately good fodder, but unsuited for hay.

S. italica, *Beauv.* VERN. *Kangni.* Cultivated for its grain. In parts of Mysore the straw is reckoned as next in quality to that of *ragi*. In the Montgomery district the *bhusa* is considered a strengthening food. It is known in the United States as "Hungarian grass" and is much valued as forage; also in Australia.

S. verticillata, *Beauv.* A coarse grass common in shady places. Cattle eat it when young.

Sorghum halepense, *Pers.* (**Andropogon Sorghum**, *Brot.*, var. **halepensis** in *Hach. Monogr.*). VERN. *Baru.* Said to be good for grazing and for hay, but not considered wholesome until after the rains are over. Opinions, however, are at variance on this point. In Australia it is much valued for pasturage and hay, also in the United States, where it is called "Johnson grass."

S. saccharatum, *Pers.* (**Andropogon Sorghum**, *Brot.*, var. **saccharatus** in *Hack. Monogr.*) Two varieties were introduced into India about 30 years ago, one called *Sorgho*, from China, and the other from Africa, called *Imphi*. *Sorgho* has taller stems and looser panicles of flowers. It is cultivated in tropical countries for its grain, and in temperate regions for fodder and sugar. The Chinese grow it chiefly for making alcohol. As a fodder plant it is greatly valued. It was first tried in India in 1858, and the result of the experiment showed that though it could not be compared with the ordinary sugarcane of the country as a sugar-yielder, it would prove of great value as a forage plant. Subsequent trials undertaken chiefly in South India, have confirmed this opinion. The Chief Commissioner of Mysore in his report for 1871 observes:—"With respect to the value of *Sorgho* as an article of fodder, there appears to be no doubt that it will grow fairly in this province as a dry crop, *i.e.*, on land not irrigated during the rainy season, and that if cut for fodder before seeding, it is well suited for cattle, especially milch cows, their milk being enriched to an extraordinary degree by its use in small quantities." **Mr. Phillips'** experiments with *Sorgho* at Allahabad in the years 1872, 1873, 1874 gave some wonderful results in the way of yield and profit. The United States Agricultural Department has declared that the value of *Sorgho* for feeding stock cannot be surpassed by any other crop, as a greater amount of nutritious fodder can be obtained from it in a shorter time, within a given space, and more cheaply. The African *Imphi* is a smaller plant, and though on this account less profitable as a crop it appears to be equally nutritious.

S. vulgare, *Pers.* (**Andropogon Sorghum**, *Brot.*, in *Hack. Monogr.*) VERN. *Juár.* Yields excellent fodder, green or dry, which is largely used in various parts of India. It is often specially grown as a fodder crop under the name of *chari*; in which case it is sown earlier and more thickly than when cultivated for the grain. The stalks of certain juicy varieties afford valuable feeding for milch cattle. The chopped-up straw (*karbi*) is much used as cattle food in Northern India. In the Madras Presidency the straw is less valued than that of *ragi*, but is considered superior to that of rice.

Sporobolus diander, *Beauv.* Said to be eaten by horses and cattle.

S. indicus, *R. Br.* A good pasture grass for horses, also given as fodder when young.

S. pallidus, *Nees.* VERN. *Palengi.* A gregarious species common in moist sandy ground, and affording a considerable amount of forage. A variety called *kálusra* constitutes the greater part of the grass vege-

tation of the *usar* tracts in the North-Western Provinces, and is always a sure indication of the presence of *reh* salts

Tetrapogon tetrastachys, *Hack* (*MS*) A characteristic usar grass accompanying Sporobolus pallidus, var, and often constituting the entire vegetation

T villosus *Desf*. A common Panjáb and Rájputana species, said to be a good fodder grass at Ajmere

Tragus racemosa, *Hall* Occurs on sandy ground According to Coldstream it is much grazed at Hissar, and is very nutritious, but is too small to stack

Triticum sativum, *Lamk*. (Wheat) In Northern India green wheat is largely used as fodder In the Jhang district sheep and goats are

render it more wholesome

Zea Mays, *Linn* (Maize or Indian Corn) Often given as green fodder, or dried and mixed with other green fodder

III HIMALAYAN FODDER PLANTS—EXCLUDING GRASSES

finest pasture lands of Great Britain and the Continent of Europe

Abelia triflora, *R Br*, CAPRIFOLIACEÆ. Temperate region Browsed by goats

Abies Webbiana, *Lindl*., CONIFERÆ Temperate region On the Panjáb Himálaya the twigs and leaves are cut and stored for use in winter

Acer pictum, *Thunb*, and A villosum, *Wall* SAPINDACEÆ Temperate region The branches are lopped for fodder

Alpine region A perennial herb,

Temperate region The leaves are

The leaves

on A peren-

by sheep.

and Alpine

II. INDIAN FODDER GRASS.

Setaria glauca, *Beauv.* VERN. *Bandra.* Very common, especially in damp ground. A moderately good fodder, but unsuited for hay.

S. italica, *Beauv.* VERN. *Kangni.* Cultivated for its grain. In parts of Mysore the straw is reckoned as next in quality to that of *ragi*. In the Montgomery district the *bhusa* is considered a strengthening food. It is known in the United States as "Hungarian grass" and is much valued as forage; also in Australia.

S. verticillata, *Beauv.* A coarse grass common in shady places. Cattle eat it when young.

Sorghum halepense, *Pers.* (**Andropogon Sorghum,** *Brot.*, var. **halepensis** in *Hach. Monogr.*). VERN. *Baru.* Said to be good for grazing and for hay, but not considered wholesome until after the rains are over. Opinions, however, are at variance on this point. In Australia it is much valued for pasturage and hay, also in the United States, where it is called "Johnson grass."

S. saccharatum, *Pers.* (**Andropogon Sorghum,** *Brot.*, var. **saccharatus** in *Hack. Monogr.*) Two varieties were introduced into India about 30 years ago, one called *Sorgho*, from China, and the other from Africa, called *Imphi*. *Sorgho* has taller stems and looser panicles of flowers. It is cultivated in tropical countries for its grain, and in temperate regions for fodder and sugar. The Chinese grow it chiefly for making alcohol. As a fodder plant it is greatly valued. It was first tried in India in 1858, and the result of the experiment showed that though it could not be compared with the ordinary sugarcane of the country as a sugar-yielder, it would prove of great value as a forage plant. Subsequent trials, undertaken chiefly in South India, have confirmed this opinion. The Chief Commissioner of Mysore in his report for 1871 observes:—"With respect to the value of *Sorgho* as an article of fodder, there appears to be no doubt that it will grow fairly in this province as a dry crop, *i.e.*, on land not irrigated during the rainy season, and that if cut for fodder before seeding, it is well suited for cattle, especially milch cows, their milk being enriched to an extraordinary degree by its use in small quantities." **Mr. Phillips'** experiments with *Sorgho* at Allahabad in the years 1872, 1873, 1874 gave some wonderful results in the way of yield and profit. The United States Agricultural Department has declared that the value of *Sorgho* for feeding stock cannot be surpassed by any other crop, as a greater amount of nutritious fodder can be obtained from it in a shorter time, within a given space, and more cheaply. The African *Imphi* is a smaller plant, and though on this account less profitable as a crop it appears to be equally nutritious.

S. vulgare, *Pers.* (**Andropogon Sorghum,** *Brot.*, in *Hack. Monogr.*) VERN. *Judr.* Yields excellent fodder, green or dry, which is largely used in various parts of India. It is often specially grown as a fodder crop under the name of *chari*; in which case it is sown earlier and more thickly than when cultivated for the grain. The stalks of certain juicy varieties afford valuable feeding for milch cattle. The chopped-up straw (*karbi*) is much used as cattle food in Northern India. In the Madras Presidency the straw is less valued than that of *ragi*, but is considered superior to that of rice.

Sporobolus diander, *Beauv.* Said to be eaten by horses and cattle.

S. indicus, *R. Br.* A good pasture grass for horses, also given as fodder when young.

S. pallidus, *Nees.* VERN. *Palengi.* A gregarious species common in moist sandy ground, and affording a considerable amount of forage. A variety called *kálusra* constitutes the greater part of the grass vege-

III HIMALAYAN FODDER PLANTS

Euonymus Hamiltonianus, *Wall* Temperate region Young shoots and leaves lopped for cattle

Ficus foveolata, *Wall* , URTICACEÆ Tropical and temperate regions Browsed by goats

F. hispida, *Linn* Tropical region Lopped for cattle fodder

F. nemoralis, *Wall* Tropical and temperate regions Used as cattle fodder

F. palmata, *Forsk* Tropical region Used as cattle fodder

F. religiosa. *Linn.* Tropical region A favourite fodder of elephants.

F. Roxburghii, *Wall* Tropical region The leaves are valued as fodder for cattle and elephants

F. Rumphii, *Blume* SYN **F. cordifolia,** *Roxb.* Tropical region The leaves are eaten by cattle, goats, and elephants

F. saemocarpa, *Miq* Tropical region. The leaves of this shrub are used to feed cattle (*Madden*)

Fraxinus xanthoxyloides, *Wall* , OLEACEÆ Temperate region. Much lopped for sheep and goats

Glycine Soja, *Sieb & Zucc* , LEGUMINOSÆ Cultivated in the tropical region, under the name of *bhat* The stems and leaves afford excellent fodder for all kinds of stock [The cultivated plant may be G hispida, *Maxim Ed*]

Grewia lævigata, *Vahl* , TILIACEÆ Tropical region Lopped for cattle

G. oppositifolia, *Roxb* Tropical and temperate regions The leaves and twigs are stored as winter fodder for sheep and goats

G. tiliæfolia, *Vahl* , and **G. vestita,** *Wall* Tropical region Both these trees are lopped for fodder

Hedera Helix, *Linn* , ARALIACEÆ Tropical and temperate regions Goats are fond of ivy leaves

[illegible] n Collected in Bissa-

[illegible] ropical region This

[illegible] opical region Eaten by sheep and goats.

Holoptelea integrifolia, *Planch* , URTICACEÆ SYN —**Ulmus integrifolia,** *Roxb.* Tropical region Yields fodder for cattle

Hymenodictyon excelsum, *Wall* , RUBIACEÆ Tropical region. The [illegible]

[illegible] region The leaves are

[illegible] opical and temperate re

[illegible] ves are used as fodder in

Juglans regia, *Linn* , JUGLANDEÆ Temperate region The twigs and leaves of the walnut mixed with hay are often stored in the boughs of trees for winter use

Limnanthemum nymphæoides, *Link* , GENTIANACEÆ. This aquatic herb is largely used as fodder in Kashmir, and is said to increase the milk of cows feeding on it.

[illegible] Temperate region Goats

[illegible] gion The leaves of this

[illegible] , LEGUMINOSÆ Temper- in Europe and Australia.

III. HIMALAYAN FODDER PLANTS.

Marlea begoniæfolia, *Roxb.*; CORNACEÆ. Tropical and temperate regions. The leaves are collected for sheep fodder.

Medicago falcata, *Linn.*; LEGUMINOSÆ. Wild and cultivated on the Western Himálaya.

M. sativa, *Linn.* Lucerne is cultivated to a small extent at most of the Himálayan stations as green fodder for horses.

Morus serrata, *Roxb.*; URTICACEÆ. Temperate region. The branches are lopped for cattle fodder.

Myricaria elegans, *Royle*, and **M. germanica**, *Desr.*; TAMARISCINEÆ. Temperate and Alpine regions. Sheep are said to browse on these shrubs.

Olea cuspidata, *Wall.*; OLEACEÆ. Tropical and temperate regions. The leaves are bitter and are considered to be one of the best kinds of fodder for goats and sheep. Also said to be good for cows and milch buffaloes, both increasing the quantity and improving the quality of their milk.

O. glandulifera, *Wall.* Tropical and temperate regions. The leaves are eaten by cattle, sheep, and goats.

Otostegia limbata, *Benth.*; LABIATÆ. Tropical region. Goats are said to browse on this bush on the Panjáb Himálaya.

Ougeina dalbergioides, *Benth.*; LEGUMINOSÆ. Tropical region. The branches are lopped as fodder for cattle and sometimes for elephants.

Oxalis corniculata, *Linn.*; GERANIACEÆ. A common weed in the tropical and temperate regions. Cattle, sheep, and goats eat the plant.

Oxybaphus himalaicus, *Edgew.*; NYCTAGINEÆ. Dry temperate region. This herb is collected for winter fodder.

Oxytropis microphylla, *DC.*; LEGUMINOSÆ. Alpine region. Sheep and yaks are said to browse on this perennial herb.

Phaseolus aconitifolius, *Jacq.*; LEGUMINOSÆ. (VERN. *Moth.*) This, as well as *mung* (**P. Mungo**), *urd* (**P. radiatus**), and **P. trilobus**, are cultivated to some extent by the villagers in the warmer regions of the Himálaya, and, as in other parts of India, the leaves, stems, and chaff are available as cattle food.

Physochlaina præalta, *Hook. f.*; SOLANACEÆ. Dry Alpine region. Used as cattle fodder in Lahoul.

Picea Morinda, *Link.* SYN.—**Abies Smithiana**, *Forbes*; CONIFERÆ. Himálayan Spruce. Temperate region. Affords fodder for sheep and goats.

Picrasma quassioides, *Benn.*; SIMARUBEÆ. Tropical and temperate regions. The leaves are eaten by sheep and goats.

Pistacia integerrima, *Stewart*; ANACARDIACEÆ. Tropical and temperate regions. The twigs and leaves are a favourite food of buffaloes and camels.

Pisum sativum, *Linn.*; LEGUMINOSÆ. The common pea is cultivated on the Western Himálaya up to 13,000 feet; at the higher elevations it does not ripen its seed, and is then used as fodder.

Polygonum aviculare, *Linn.*; POLYGONACEÆ. Temperate region. Sheep and goats are said to fatten when fed on this plant.

P. chinense, *Linn.* Tropical and temperate regions. Cattle are fond of this species. Many other kinds of **Polygonum** are found at various elevations on the Himálaya, and are used more or less as fodder.

Populus balsamifera, *Linn.*; SALICINEÆ. Inner ranges of Western Himálaya. The branches are often lopped for cattle fodder.

P. ciliata, *Wall.* Temperate region. Affords fodder for goats.

P. nigra, *Linn.* (Lombardy Poplar.) Is cultivated in the temperate regions of the Western Himálaya, and the branches are often lopped for cattle fodder.

III
HIMALAYAN
FODDER
PLANTS

Potamogeton crispus, *Linn.*, NAIDACEÆ This aquatic plant is said to be used as fodder in Ladák P. gramineus, P. lucens, and P. natans, are similarly used in other parts

Potentilla fruticosa, *Linn.*, ROSACEÆ Temperate and Alpine regions

. browsed by sheep.

Temperate region Yields

Pueraria tuberosa, *DC.*, LEGUMINOSÆ Tropical region The leaves are considered to be very good fodder for horses The tubers, chopped up, are also sometimes given

Pyrus Pashia, *Ham.*, ROSACEÆ Tropical and temperate regions Cattle

Temperate region The leaves

leaves are stored for winter

Q. incana, *Roxb.* Temperate region. The leaves are given to cattle and sheep

Q. lanuginosa, *Don.* Temperate region. The leaves are used as fodder

Q. semicarpifolia, *Smith* Temperate region The leaves are stored as winter fodder for cattle

Randia dumetorum, *Lamk.*, RUBIACEÆ Tropical region. The leaves are used as fodder for cattle, sheep, and goats

R. uliginosa, *DC.* Tropical region The leaves are browsed by cattle.

Rhus parviflora, *Roxb.*, ANACARDIACEÆ. Tropical region Cattle and goats eat the leaves

Salix acmophylla, *Boiss.*, SALICINEÆ. Tropical region The tree is often lopped for cattle fodder

S. daphnoides, *Vill.* Temperate and dry Alpine regions Yields fodder for cattle.

S. elegans, *Wall.* Temperate region Cattle are fond of the leaves

S. tetrasperma, *Roxb.* Tropical and temperate regions This tree is often lopped for cattle fodder

Sapindus Mukorossi, *Gærtn.*, SAPINDACEÆ Tropical region The leaves are given to cattle

and temperate

A small an-

erate regions

Lopped exten-

Syringa Emodi, *Wall.*, OLEACEÆ Temperate and Alpine regions The *leaves are eaten by goats*

Tanacetum senecionis, *Gay*, COMPOSITÆ Alpine and Western Himálaya Browsed by goats

Taxus baccata, *Linn.*, CONIFERÆ Temperate region In Europe goats, sheep, and rabbits eat the leaves of the Yew freely Brandis says that the leaves are considered poisonous, but not everywhere, nor under all circumstances

Terminalia Chebula, *Retz.*, and T. tomentosa, *Bedd.*, COMBRETACEÆ Tropical region Afford fodder for cattle

Trifolium fragiferum, *Linn.*, LEGUMINOSÆ Temperate region. Used in Kashmir as fodder for cattle

III. HIMALAYAN FODDER PLANTS.

Trifolium pratense, *Linn.* Temperate region. Well known in Europe as Red or Broad Clover. It grows wild on the Himálaya and is occasionally collected for fodder.

T. repens, *Linn.* Dutch or White Clover. Temperate and Alpine regions. An essential constituent of every good pasture in Europe. It is plentiful on the Himálaya as a wild plant.

Tulipa stellata, *Hook.;* LILIACEÆ. Tropical and temperate regions. The bulbs are eaten by cattle.

Ulmus Wallichiana, *Planch.;* URTICACEÆ. Temperate region. Lopped extensively for cattle fodder.

Vicia hirsuta, *Koch.;* LEGUMINOSÆ. Tropical and temperate regions. Occasionally cultivated as a fodder plant under the name of *masur chana* up to 5,000 feet in Kumáun. Cattle and goats eat it.

Vigna Catiang, *Endl.;* LEGUMINOSÆ. A variety called *Lobiya-riánsh* is cultivated in the tropical region and affords fodder for cattle.

V. vexillata, *Benth.* Temperate region. Cattle and goats eat this plant.

Wendlandia exserta, *DC.;* RUBIACEÆ. Tropical region. Cattle eat the leaves.

Woodfordia floribunda, *Salisb.;* LYTHRACEÆ. Tropical region. Cattle and goats eat the leaves.

Wrightia tomentosa, *R. & S.;* APOCYNACEÆ. Tropical region. The leaves are eaten by cattle.

Xanthium strumarium, *Linn.;* COMPOSITÆ. Tropical region. A common weed of cultivated ground. Probably introduced from America, where it is said that cattle eat the young plants.

Zizyphus oxyphylla, *Edgew.;* RHAMNEÆ. Tropical and temperate regions. Goats are fond of the leaves.

Z. xylopyra, *Willd.* Tropical region. The young shoots, leaves, and fruit are eaten by cattle and goats.

IV. HIMALAYAN GRASSES. 674

IV. HIMÁLAYAN GRASSES.

The gradual changes which determine the character of the Flora at different altitudes on the Himálayan Ranges is well exemplified in the case of grasses. As we ascend from the plains, the sub-tropical forms are gradually lost sight of, other species and genera taking their place. On reaching an elevation of about 7,000 or 8,000 feet, the majority of the species are found to be characteristic of a temperate climate, many European genera, such as **Avena, Brachypodium, Bromus, Dactylis,** and **Festuca,** being represented. At still higher elevations, and up to the limit of melting snow, we meet with many species identically the same as occur on the mountains of Europe and America and along the shores of countries within the Arctic region.

Although very little is known concerning the nutritive value of Himálayan fodder grasses individually, it is, nevertheless, certain that excellent pasturage is obtainable at every elevation during certain seasons of the year. The wide open stretches of grass land (maidáns) extending from the upper limits of the forests towards the snow line constitute the finest feeding grounds for cattle and sheep during the summer months. Many of the grasses which flourish in these elevated meadows are known to be highly prized constituents of the best European pastures, and with them are found many allied species which analysis would no doubt prove to be equally valuable.

A. SUB-TROPICAL. 674

A.—The following is a list of the more important plains or sub-tropical fodder-yielding species which are found at various elevations approaching the temperate region:—

Andropogon annulatus, *Forsk.*

Food and Fodder. (*J F Duthie*) | FODDER.

IV. HIMALAYAN GRASSES. A SUB-TROPICAL.

Andropogon intermedius, *R.Br* Var. punctata.
A Ischæmum, *Linn*
A. Schœnanthus, *Linn*
A. serratus, *Thunb* (SYN —A TROPICUS, *Spreng*)
A. Trinii, *Steud* (SYN —Chrysopogon serrulatus, *Trin*) Largely used as fodder
Anthistiria ciliata, *Linn. f.*
Apluda aristata, *Linn* Abundant and largely used as fodder.
Arthraxon ciliaris, *Beauv.*
A. echinatus, *Hochst*
A lanceolatus, *Hochst.*
A. microphyllus, *Hochst*
Arundinella nepalensis, *Trin* Largely represented in the bundles of grass supplied for horses and cows at Simla.
A. Wallichii, *Nees.*
Arundo madagascariensis, *Kunth*
A mauritanica, *Desf*
Chionachne barbata, *R Br.*
Chloris digitata, *Steud*
Coix lachryma, *Linn.*
Cynodon Dactylon, *Pers.* (*Dúb*)

ultivated.

E. plumosa, *Link.*
E. poæoides, *Beauv.*
E tenella, *Beauv.*
E. uniloides, *Nees*
Heteropogon contortus, *R. & S.* (Spear-grass)
Imperata arundinacæ, *Cyrill.*
Isachne australis, *R Br*
Ischæmum rugosum, *Gærtn.*
Manisuris granularis, *Swartz*
Ophiurus perforatus, *Trin*
Oplismenus Burmanni, *Retz* Grows well under the shade of trees
Oryza sativa, *Linn* (Rice) Cultivated
Panicum ciliare, *Retz*
P. colonum, *Linn* (*Sawánk*)
P Crus-Galli, *Linn*
P. flavidum, *Retz*

l up to 11,000 feet. It yields

P. petiveri, *Trin*
P. psilopodium, *Trin*
P. sanguinale *Linn* (*Takria*)
lon) Cultivated.
a) Cultivated.

IV.
HIMALAYAN GRASSES.

Saccharum spontaneum, *Linn.* (*Káns.*)
Setaria glauca, *Beauv.*
S. intermedia, *R. & S.*
S. italica, *Beauv.* (*Kangni.*) Cultivated.
S. verticillata, *Beauv.*
Sorghum halepense, *Pers.* (*Baru.*)
Sporobolus diander, *Beauv.*
S. indicus, *R. Br.*
Zea Mays, *Linn.* (Indian Corn.) Cultivated.

B.
TEMPERATE.

B. The names of the species included in the list which follows, are, more strictly speaking, those of Himálayan grasses, excepting a few, growing within the temperate region, which occur also on the more elevated portions of Central and Southern India. Our knowledge of the grass vegetation of the Himálaya is by no means complete, and several species have yet to be determined botanically.

Agropyrum caninum, *R. & S.* Alpine region.
A. longiaristatum, *Boiss.* Alpine region.
A. semicostatum, *Nees.* Temperate and Alpine regions.
Agrostis alba, *Linn.* (Fiorin, or Creeping Bent grass) Temperate region. A variety of this (**stolonifera**) is a well-known fodder grass in Europe and is useful for mixing with other grasses. See *Sutton's Permanent and Temporary Pastures, p. 25;* and *Stebler, and Schröter, Best Forage Plants, p. 65 (Eng. Ed.).*
A. ciliata, *Trin.* Alpine region.
A. Hookeriana, *Munro.* Temperate and Alpine regions.
A. pilosula, *Trin.* Temperate region.
A. Roylei, *Trin.* Temperate and Alpine regions
Alopecurus pratensis, *Linn.* (Meadow Fox-tail Grass.) Temperate and Alpine regions. One of the best of English pasture grasses. See *Sutton's Permanent and Temporary Pastures, p. 26; Stebler and Schröter, Best Forage Plants, p. 65 (Eng. Ed.).*
Andropogon distans, *Nees.* Temperate region.
A. Gryllus, *Linn.* SYN.—**Chrysopogon Gryllus**, *Trin.* Sub-tropical and temperate regions
A. micranthus, *Kunth.*, var. **villosulus**. Sub-tropical and temperate regions; also on Parasnáth and Mount Abu.
A. montanus, *Roxb.* Sub-tropical and temperate regions; also on Mount Abu.
A. Nardus, *Linn.*, var. **exsertus**. Sub-tropical and temperate regions.
A. tristis, *Nees.* Temperate region.
Anthistiria anathera, *Nees.* Sub-tropical and temperate regions. It is much thought of by the hillmen as a good fodder grass.
Anthoxanthum odoratum, *Linn.* Temperate region. Probably introduced. A perennial grass, thriving in all kinds of soil.
Arthraxon submuticus, *Nees.* Sub-tropical region.
Arundinaria falcata, *Nees.* }
A. Falconeri, *Benth. & Hk. f.* } Temperate region.
A. spathiflora, *Trin.* }
Arundinella setosa, *Trin.* Sub-tropical and temperate regions.
Avena pratensis, *Linn.* (Meadow Oat Grass) Alpine region. Recommended in Europe for dry soils.
A. pubescens, *Linn.* (Downy Oat Grass.) Temperate region. Grown in Europe for fodder.
A. sativa, *Linn.* (Oats.) Cultivated up to the Alpine region.
A. virescens, *Nees.* Alpine region.
Brachypodium pinnatum, *Beauv.* Temperate region.

Food and Fodder (J F Duthie)

FODDER

HIMALAYAN GRASSES B TEMPERATE

Brachypodium sylvaticum, R & S Temperate region
Briza media Linn (Quaking grass) Temperate and Alpine regions A familiar ingredient in English pastures especially on a dry soil
Bromus arvensis, Linn
B asper, Murray Temperate region Recommended in Europe for wooded localities
B confertus Bieb
B confinis Nees Temperate and Alpine regions
B crinitus Boiss Alpine region
B Danthoniæ, Trin Temperate and Alpine regions
B inermis Leyss [illegible]
B japonicus, Thu
B membranaceus
B mollis, Linn
B patulus Mert
B squarrosus, Li[illegible]
[illegible]

[illegible] Alpine region
[illegible] rate region Highly
[illegible] Suttons' Permanent
[illegible] Schröter, Best Forage

[illegible] ion Considered by
[illegible] the Australian species

Deschampsia cæspitosa Beauv Alpine region.
Elymus dasystachyus Trin Alpine region
E nutans Griseb Temperate region.
E sibiricus, Linn Alpine region
Festuca dura, Vill Kashmir
F elatior, Linn Temperate region (Tall Fescue) Much used in Europe for fodder and considered very nutritious See Suttons' Permanent and Temporary Pastures, p 40
F filiformis, Jacqm Alpine region
F gigantea Vill Temperate region
F ovina Hack (Sheep's Fescue) Alpine region Well known in Europe as affording excellent grazing for sheep but unsuitable for hay There [illegible]

Glyceria aquatica, Presl var caspica Temperate region
G fluitans, R Br (Manna grass) Temperate region
Graphephorum nutans, Munro Alpine region Evidently a good fodder grass
Hierochloe laxa, R Br Alpine region It emits during the process of drying a perfume like that of the English hay-scented grass Anthoxanthum odoratum H borealis of Western Europe and H redolens,

HIMALAYAN GRASSES.

B. TEMPERATE.

inhabiting the mountains of Australia and New Zealand, have the same properties.

Hordeum murinum, *Linn.* Temperate region, descending to the plains in North-Western Panjáb.

H. pratense, *Linn.* } Alpine region.
H. sylvaticum, *Huds.* }

H. vulgare, *Linn.* (Barley.) Cultivated up to the Alpine region. There are many varieties, including H. ægiceras, a beardless kind found in Tibet, and Siberian barley (H. cæleste). A third variety known in North Kumaun as *oi jáu* is cultivated for the manufacture of a strong spirit.

Isachne albens, *Trin.* Temperate region.

Ischæmum Hugelii, *Hack.* Temperate region.

I. notatum, *Hack. Monogr., p. 246.* Temperate region of East Kumáon.

Kœleria cristata, *Pers.* Temperate region. Regarded in Europe as a fairly nutritious grass.

Lolium perenne (Perennial Rye-grass). Alpine region. Largely cultivated in Europe, and a valuable constituent of the best pasture land. There are very many varieties. See *Suttons' Permanent and Temporary Pastures, p. 49; Stebler and Schröter, Best Forage Plants, p. 20 (Eng. Ed.).*

L. temulentum, *Linn.* (Darnel). Temperate region; also occurring as a weed of cultivation in the plains of North-Western Panjáb. The grain is very liable to become ergotized.

Melica ciliata, *Linn.* Temperate and Alpine regions. Mueller says "a perennial fodder grass particularly desirable for sheep." The following species are also recorded as occurring in the Alpine region:—M. Jacquemontii, *Dcne.*, M. micrantha, *Nees*, M. persica, *Kunth.*, M. secunda, *Regel*, and M. vestita, *Boiss.*

Milium effusum, *Linn.* (Millet Grass.) Temperate region. It is said to be relished by cattle in Europe, and the grain can be used like millet.

Muehlenbergia Hugelii, *Trin.* }
M. geniculata, *Nees.* } Temperate region.
M. sylvatica, *Trin.* }
M. viridissima, *Nees.* }

Oplismenus acuminatus, *Nees.* Temperate region.

O. compositus, *R. & S.* Sub-tropical region.

O. undulatifolius, *R. & S.* Temperate region.

Oryzopsis paradoxa, *Nutt.* Temperate region. Besides the above are four or five other species, not satisfactorily determined, some of which are found within the Alpine region.

Panicum excurrens, *Trin.* Sub-tropical and temperate regions. Foliage like that of P. plicatum.

P. neurodes, *Schult.* Sub-tropical region.

P. vestitum, *Nees.* Sub-tropical and temperate regions.

Paspalum jubatum, *Griseb.* Temperate region.

P. minutiflorum, *Steud.* Sub-tropical region.

Pennisetum flaccidum, *Griseb.* Temperate and Alpine regions. Often a weed of cultivation at high elevations.

P. lanatum, *Klotsch.* Dry temperate region.

P. triflorum, *Nees.* Sub-tropical and temperate regions; abundant.

Phleum alpinum, *Linn.* (Alpine Catstail.) Alpine region.

P. arenarium, *Linn.* } Temperate region.
P. asperum, *Vill.* }

P. pratense, *Linn.* (Timothy, or Meadow Catstail.) Extensively cultivated in Europe and much valued for pastures on a heavy soil. Royle records

Food and Fodder (J F Duthie) | FODDER

IV HIMALAYAN GRASSES

B TEMPERATE

it from the Chor Mountain See *Suttons' Permanent and Temporary Pastures, p 58*, *Stebler and Schroter, Best Forage Plants, p 52 (Eng Ed)*

Phragmites communis, *Trin* On the inner Panjáb Himálaya up to

P
P

dered good for early pasturage

P arctica, *Br*
P attenuata, *Trin*
P bulbosa, *Linn*
P cenisia, *All*
P compressa, *Linn*
P laxa, *Hænke*
P nemoralis, *Linn*

} Alpine region

P pratensis, *Linn* (Smooth stalked Meadow Grass) Alpine region for early hay It is the Blue See *Suttons' Permanent and Schroter Best Forage Plants,*

Pollinia ciliata, *Trin* Temperate region
P hirtifolia, *Hack Monogr p 165* Temperate region
P japonica, SYN —Miscanthus sinensis, *Anders*, in *Hack*, *Monogr. p 105* Temperate region
P Lehmanni, *Nees*
P mollis, *Hack* } Temperate region.
P nepalensis SYN —Miscanthus nepalensis, *Hack Monogr p 104*
P nuda *Trin*
P phæothrix, *Hack*, *Monogr*, *p 168*
P velutina, *Hack* SYN —Erianthus velutinus, *Munro, MS* } Temperate region
Polypogon fugax, *Nees* Sub tropical and temperate regions, in wet ground
Rottbællia speciosa, *Hack* SYN —Ischæmum speciosum, *Nees*, Vossia speciosa Temperate region.
Setaria viridis, *Beauv* Temperate and Alpine regions, usually occurring as a weed of cultivation
Sporobolus ciliatus, *Presl* Sub-tropical and temperate regions
Stipa (Orthoraphium) Roylei *Nees*) Temperate and Alpine regions

Trisetum aureum, *Nees*
T subspicatum, *Beauv* } Alpine region
Triticum sativum, *Lamk* Wheat is cultivated at various elevations, and in Tibet has been observed at 16 000 feet above the sea

F. 674

Forbidden Fruit, see Citrus decumana, *Linn.;* Vol. II., 348.

Forest Trees, see Timbers.

(*J. Murray.*)

FORSKOHLEA, *Linn.; Gen. Pl., III., 393.*

675

Forskohlea tenacissima, *Linn.; Fl. Br. Ind., V., 593;* URTICACEÆ.

Habitat.—Said to be a native of India, occurring at Simla (*Stocks*) and in the Panjáb (*Jacquemont, Fleming*), extending to Afghánistan and Beluchistan.

FIBRE. Bark. 676

Fibre.—The BARK yields a strong fibre: hence the origin of the specific name, but no definite information is obtainable regarding its economic use.

Fourcroya, *Schult.,* see Furcrœa, *Vent.*

Foxglove Purple, Digitalis purpurea, *Linn.;* SCROPHULARINEÆ.

677

A European plant, naturalised in gardens in the temperate regions of India.

FRAGARIA, *Linn.; Gen. Pl., I., 620.*

A genus of perennial herbs, belonging to the Natural Order ROSACEÆ, of which the swollen fleshy receptacle forms the STRAWBERRY. Distributed through the temperate regions of the Northern Hemisphere, South America, the Sandwich Islands, and Bourbon.

[ROSACEÆ.

678

Fragaria indica, *Andr.; Fl. Br. Ind., II., 343; Wight, Ic., t. 989;* THE INDIAN STRAWBERRY.

Syn.—F. MALAYANA, *Roxb.;* F. NILGIRICA, *Zenker;* F. ARGUTA, *Lindl.;* F. ROXBURGHII, *W. & A.;* DUCHESNEA FRAGARIODES, *Sm.;* D. CHRYSANTHA, *Miq.;* D. FRAGIFORMIS, *Don.;* POTENTILLA DENTICULORA and WALLICHIANA, *Ser.;* P. DURANDII, *Torr. & Gr.;* P. FRAGARIÆFOLIA, *Klotsch;* P. TRIFIDA, *Lehm.*

Vern.—*Paljor, kanzars, ingrach, yangtarsh, búnún musrini, bana-phal, tawai,* PB.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 409; Stewart, Pb. Pl., 80; Atkinson, Ec. Prod., N.-W. P., Pt. V., 68, 69; Gazetteer, N.-W. P., X., 309; Balfour, Cyclop., 1149.*

Habitat.—This plant (a small yellow-flowered Fragaria) grows on the Himálaya from east to west, at altitudes of 5,000 to 8,000 feet; also on the Khásia Hills and Nilghiris.

FOOD. Fruit. 679

Food.—The indigenous strawberry yields abundantly a very insipid FRUIT, which, however, can be much improved by cultivation.

680

F. nilgerrensis, *Schld.; Fl. Br. Ind., II., 344; Wight, Ic., t. 988.*

Syn.—F. ELATIOR, *W. & A.*

Habitat.—A species, which may turn out to be only a variety of F. vesca, found on the Khásia and Nilghiri mountains.

It is a robust form and bears a large strawberry, globose in form but inclined to be conoidal in the Nilghiris and flattened in the Khásia hills; is of a pale pinkish-white colour.

FRUIT. 681

Fruit.—There is no account of its cultivation, but it might when crossed with F. vesca yield a fine variety of strawberry.

682

F. vesca, *Linn.; Fl. Br. Ind., II., 344.*

THE STRAWBERRY.

Vern.—*Kanzars, ingrach, bunun, tawai, tash, fraga, bana-phal,* PB.

References.—*Stewart, Pb. Pl., 80; DC., Origin, Cult. Pl., 203; Firminger, Manual of Gard. for Ind., Part II., 252; Atkinson, Him. Dist., 309, 713; Lisboa, U. Pl. Bomb., 155; Birdwood, Bomb. Pr., 150; Balfour, Cyclop.,*

Strawberries. (*J. Murray*)

FRAGARIA vesca.

III, 744; *Sr* ...
Simla Dist, *1*
V (Proc), *5*
(App), *83*,

Habitat.—Found
Kashmír, altitude 5,0
feet (*Hooker*); 6,000 to 10,000 feet in Manipur, also found in the Ruby Mines and Bhamo districts o
the natives of India till its cul
Europeans It is significar
treats in the utmost detail
Akbar, in India, Kashmír,
strawberry.

Dr. Stewart says that the fruit of the Himálayan plant is excellent when gathered dry, and improves by cultivation It is one of the most wholesome of fruits.

CULTIVATION.

CULTIVATION. History 683

HISTORY OF.—Since the first introduction of the cultivation of the strawberry into India, the plant has spread in the most remarkable way in

stands remarkably well the great heat of the hot weather, and produces fruit abundantly and of very good quality from February to May, the season of ripening varying in different parts, The *Madras Manual of Administration* (II, 27, 85, 124) reports F. vesca as thriving fairly well on parts of the Western Ghats, and in the Shevaroys In Lower Bengal, and the plains of Madras and Bombay, on the other hand, the plant does not thrive; it is seemingly unable to withstand the *moist* heat of those provinces.

The earliest obtainable record of successful cultivation in the plains is one in the *Trans Agri-Hort. Soc* (I, 21) by Dr. Tytler, in which he refers to the plant as growing to perfection on the banks of the Jumna near Allahabad It is not, however, definitely mentioned whether the plants alluded to were English stock or the indigenous F. vesca, but subsequent

Method of. 684

CULTIVATION.

established they will perhaps begin to send out runners. Then it would be well to remove, though some persons are of opinion that the doing so causes a larger development of leaves than is favourable to the productiveness of the plant. By February they will have become good large plants, and may be expected then to be in full blossom."

The strawberry may be propagated either by seed or by rooted runners, but varieties can only be obtained from sports in seedlings or by hybridization.

Regarding its *cultivation in Bombay*, the Director of Land Records and Agriculture has furnished the following report, dated September 1889:—"Though it is much met with in gardens above the Ghâts it can only be successfully grown on the two hill stations of Mahábleshwar and Panchgani, where the fruit develops to a good size. The climate of the plains does not seem to agree with the plant. In Gondal and Kathiawár the plant was twice or thrice tried without success. Towards the end of 1887 about 2,000 strawberry plants were sent from Saharanpur to Mahábleshwar and were distributed amongst cultivators. The plants have taken kindly to the soil, and the plantations are in a flourishing condition. The cultivation of the strawberry has not, however, gone as yet beyond the experimental stage."

The history of the ready adaptability of **F. vesca** to the intense dry heat of the plains of Behar, the *Central Provinces, and Upper India,* and of the *greatly increasing production of the fruit,* encourages the hope that the cultivation of the *strawberry,* in the vicinity of hill stations, and of towns in the plains of which the climatic conditions are favourable, may become a large branch of market gardening. The outturn on even a very small area is very great in comparison to the outlay of money required; but the crop is one that absolutely demands a great deal of attention. It is said that in the Bombay Dekkan, where the plant is peculiarly difficult to grow, a bed of a few square yards will bring in from £15 to £20 the season.

It also appears probable, when one considers the history of the cultivated strawberry in Europe, that *a judicious system of crossing* the indigenous **F. vesca** with European stock, or with the fine large **F. nilgerrensis**, might produce varieties of fruit in no way inferior to those obtained in Europe.

The success that has already attended the efforts of private and market gardeners in many parts of the country, perhaps especially in the large strawberry gardens at Siri near Simla, ought to encourage similar endeavours on the part of Natives near other large centres of demand.

Francœuria crispa, *Cass.;* see Pulicaria crispa, *Benth.;* COMPOSITÆ.

Frankincense, see Boswellia, Vol. I., 511.

FRAXINUS, *Linn.; Gen. Pl., II., 676.*

A genus of trees consisting of 30 species found in the north temperate regions of both hemispheres, of which 4 are natives of India.

685

Fraxinus excelsior, *Linn.; Fl. Br. Ind., III., 606;* OLEACEÆ.

THE COMMON ASH.

Syn.—F. HETEROPHYLLA, *Vahl.;* F. MOORCROFTIANA, *Wall.;* ORNUS MOORCROFTIANA, *G. Don.*

Vern.—*Súm, kúm,* PB.

References.—*Brandis, For. Fl., 303; Gamble, Man. Timb., 256; Pharm. Ind. 136; Ainslie, Mat. Ind., I., 209; O'Shaughnessy, Beng. Dispens., 435 Flück. & Hanb., Pharmacog., 409.*

The Common Ash (J. Murray) FRAXINUS excelsior.

Habitat —A large tree of the temperate West Himalaya and Western Tibet from 4,000 to 9,000 feet, distributed from the Caucasus westward

Jhelam, Chenab and Ravi rivers,

CULTIVATION 686

r (page 193), gives the following description of the propagation and cultivation of the Ash in England —

"It is propagated by seeds and varieties are extended by grafting and budding on plants of the same species The seeds are enclosed in what are termed 'samaras,' or keys, which are generally ripe for gather-

would be injured In the should be sown in rows ulverised soil They are r if not sown thin—say one seed to every three square inches, and the covering of earth should not exceed ¾ inch In the following spring the plants will be ready for being transplanted into the nursery rows, which may be 15 inches from one another, and 4 inches plant from plant in the rows

"When the plants have stood two years in the nursery rows they may be removed into the forest ground, but if wanted of a larger size they may be left a year longer

"The ash is in all respects a hardy tree and accommodates itself to *most soils and situations not too high lying and exposed, but to grow it to* large dimensions of timber, and to have that of good quality, the tree must be planted in a rather low-lying situation and on a strong loamy soil, but not a retentive one, nor on one wet in the sub soil There is no situation so well fitted for the profitable growth of the ash as the sides of ravines having a good strong loamy soil, where there is a constant supply of water for the roots from the ground above"

Brandis says that the tree requires much light, and that, like the teak, it grows best in a mixed forest

MEDICINE Manna 687

Medicine —A small quantity of saccharine matter exudes on incision

Bark 688

Leaves. 689

TIMBER 690

It is of very great value on account of its toughness and elasticity,

would seem no very great reason why the Ash should not become an important cultivated timber in this country.

FOOD. 691

Food.—The fruit in England is preserved in vinegar as a pickle.

DOMESTIC. 692

Domestic, &c.—The ash coppices well (*Brandis*).

693

Fraxinus floribunda, *Wall.; Fl. Br. Ind., III., 605.*

Syn.—FRAXINUS UROPHYLLA, *Wall.*; ORNUS FLORIBUNDA, *Dietr.*; O. UROPHYLLA, *G. Don.*

Vern.—*Kanen, lakan*, NEPAL; *Augan, angú, dakkúri*, N.-W. P.; *Angú, [illegible], tunnu, thum, kúm, kamer, tunni*, PB.; *Banarish*, AFG.

References.—*Brandis, For. Fl., 3[illegible]; Gamble, Man. Timb., 256; Stewart, Pb. Pl., 1[illegible]; Ainslie, Mat. Ind., I., 2[illegible]; O'Shaughnessy, Beng. Dispens., 4[illegible]; Atkinson, Him. Dist., 737; Gazetteers:—Rawalpindi Dist., 1[illegible]; N.-W. P., X., 31[illegible]; Gurdaspur Dist., 55; Hazara Dist., 14; Indian Forester, VI., 12[illegible]; IX., [illegible]; X., 317; XIII., 67.*

Habitat.—A large deciduous tree of the Himálaya, from the Indus to Sikkim, between 5,000 and 8,500 feet.

MEDICINE. Manna. 694

Medicine.—A concrete, saccharine exudation (manna) is obtained from the stem, by incision, and is employed as a substitute for the officinal manna.

The sugar contained in this exudation, called mannite, differs from cane and grape sugar in not being readily fermentable; though under certain conditions it does ferment, yielding a quantity of alcohol varying from 13 to 33 per cent. (*Dr. Warden*). Like the officinal manna, this is used for its sweetening and slightly laxative properties.

TIMBER. 695

Structure of the Wood.—White, with a light-red tinge, no heartwood, soft to moderately hard. Weight 48lb per cubic foot. It is very similar in structure to the wood of the European ash, from which, however, it differs in having no heartwood.

It is very valuable, possessing most of the qualities of European ash, and is used for oars, jampan poles, ploughs, platters, spinning-wheels, and other purposes.

The Conservator of Forests, Panjáb, writes: "In 1879 samples were supplied to the Timber Ordnance Agent, Fattehgarh, for sponge staves."

696

F. ornus, *Linn.; DC., Prodr., VIII., 274.*

THE FLOWERING ASH.

Syn.—ORNUS EUROPÆA, *Pers.*

This, though not an Indian species, may be briefly considered, as it is the principal source of the drug known officinally in Europe as "Manna." **F. rotundifolia** and **F. excelsior** are, however, to a smaller extent also manna-yielding ashes.

Vern.—*Shir-khist*, HIND.; *Shir-khist*, DEC.; *Méná*, TAM., TEL.; *Manna*, MALAY; *Mann, shir-khisht*, ARAB.; *Shir khihst*, PERS.

References.—*Pharm. Ind., 136; Ainslie, Mat. Ind., I., 208; O'Shaughnessy, Beng. Dispens., 434; Flück. and Hanb., Pharmacog., 409; Irvine, Mat. Med., Patna, 101; Birdwood, Bomb. Pr., 52; Smith, Dic., 26; Kew Off. Guide to the Mus. of Ec. Bot., 94.*

Habitat.—A small tree of the mountains of South Europe and Asia Minor, extending in the Mediterranean region westwards to Corsica and Eastern Spain.

MEDICINE. Manna. 697

Medicine.—The name MANNA is applied to the saccharine exudation obtained, by incision, from this tree as well as to other substances. Originally the name was applied to the miraculous food provided for the Israelites during their journey from Egypt, but since then it has come to be used for most saccharine exudations. The officinal manna of European medicine is the production of the three species of ash above mentioned, principally of F. ornus, and is frequently known from that circumstance as Calabrian manna. It appears that the manna of Indian medi-

The Flowering Ash: Manna. (J. Murray) FRAXINUS ornus.

MEDICINE Imported manna. 698

c ... khist of the Turkestan, ... nummularia, ... d Hanbury ... ce it to be indisputably derived from Cotoneaster. They write: "It is in irregular roundish tears, from about ¼ up to ⅜ inch in greatest length, of an opaque ... fingers ... residue ... found ... at the ... besides starch and cellulose.

Indigenous manna 699

There is, however, a certain amount of manna obtained in India from ...

at present investigated. Dr. Dymock to whom a specimen has samples have been sent has obligingly drawn the writer's attention to an interesting passage in the *Makhzan-el-Adwiya*, the author of which speaking of *Shir-khisht* writes, "and they say that in the towns of the Subeh of Behar, Patna, and Bhágulpur, a substance like *shir-khisht* is obtained from a plant, called, in Hindi, *Katra*; and they prepare it in this manner: the tree is cut down and fire applied to the root, which causes a flow of boiling juice which concentrates into lumps like white ... the *shir khisht* ... 'I have myself ... possibly be the substance obtained from the Central Provinces, which is evidently a ... igs, ... ded ... As ... the ... ding manna from the tips of the twigs, which, cementing the needles into clotted masses, and melting through the heat of the sun, has encrusted ...

* Dymock reports that it does not appear to agree with any known manna. It, however, contains glucose and a crystalline sugar-like mannite.

† Rhododendron arboreum has since been observed to be exuding manna as a result of Aphides.

Dr. Ainslie writes: "The Hindus know and care little about manna; the Muhammadans of India prescribe it as a laxative to children and delicate women, in doses from ʒ 2 to ℥ ½; and the Arabians give it a place amongst their *Mushilat-sufra* (cholagogues)."

700

Fraxinus xanthoxyloides, *Wall.; Fl. Br. Ind., III.*, 606.

Syn.—F. MOORCROFTIANA, *Brand.*; ORNUS XANTHOXYLOIDES, *G. Don.*

Vern.—*Auga, gaha*, N.-W. P.; *Hannu, nuch, shilli, chuj, thum, shangal, kanóch, hanóch*, PB.; *Shang, hagai*, PUSHTU.

References.—*Brandis, For. Fl.*, 304; *Gamble, Man. Timb.*, 256; *Stewart, Pb. Pl.*, 139; *Atkinson's Flora of the Kuram Valley*, 79; *Baden Powell, Pb. Pr.*, 581; *Balfour, Cyclop.*, *I.*, 1151; *Indian Forester, V.*, 185, 478; *Rawalpindi Gazetteer*, 15; *Simla Gazetteer*, 11.

Habitat.—A small tree, or more often a shrub, met with in Afghánistán, the Trans-Indus, and from the Jhelum to Kumaon in the North-West Provinces (*Gamble*). Aitchison in his *Kuram Valley Flora* mentions it as being found on the ascent to Péwar Kotal, and occasionally all over the Hariab district to Drékalla and Kárátigah. Brandis gives its distribution as the North-Western Himálaya from Kashmír to Kumaon, between 3,000 and 9,000 feet, and Lace mentions the shrub as growing near Quetta.

TIMBER. 701

Structure of the Wood.—A good elastic wood of small size, suitable for staves, jampan poles, walking-sticks, and employed for making ploughs in Kághán (*Baden Powell*). Used for agricultural implements (*Lace, Quetta*).

FODDER. 702

Fodder.—Dr. Stewart says its leaves are used as fodder, and Mr. Lace writes that in Southern Afghanistan the tree is never allowed to attain f ll size, owing to its young branches being continually lopped and the leaves given to sheep and goats, which are very fond of them.

French Bean, see **Dolichos Lablab**, pp. 184, 185, also **Phaseolus.**

French Honeysuckle, see **Hedysarum coronarium**, *Linn.*; LEGUMINOSÆ.

703

FROGS.

Vern.—*Renak*, HIND; *Bheng*, BENG.

Amphibians of the sub-class BATRACHIA and order ANURA, of which they constitute the family RANIDÆ. They occur very commonly in all parts of India, and are especially noticeable during the rains, when their deafening croaking resounds on all sides. Several species are peculiar to definite localities, and many are characterised by the peculiar sounds they produce. Amongst these one may be noticed, an inhabitant of the Khasia Hills, which has a croak so exactly similar to the tinkling of a hammer on an anvil, that even some of the most accurate observers appear to have been deceived by it (*Him. Journ*, *II.*, 295). But perhaps the most amusing record of frogs in Indian literature occurs in the *Ain-i-Akbari*, the writer of which remarks: "Frogs also may be trained to catch sparrows. This looks very funny." Adams, in his *Wanderings of a Naturalist in India*, mentions that at Poona having shot a sun-bird which fell on the margin of a pool, he saw it seized and devoured by a large green frog. This lends a certain support to the somewhat extraordinary statement made by Abul Fazl. Mr. Edgar Thurston, the Superintendent of the Central Museum, Madras, in a recent exhaustive monograph on the Batrachia, Salientia, and Apoda of Southern India, has described six genera as natives of that region and Ceylon; *viz.*, 1, Rana; 2, Rhacophorus; 3, Ixalus; 4, Nyctibatrachus; 5, Nannobatrachus; and 6, Nannophrys; of which the first comprises 19; the second 14; the third 19; the fourth 2; the fifth 1; and the sixth 2 species. Scientific information regarding the occurrence and distribution of the species of

this family in other parts of India appears to be meagre nor is there any *record of the exact species, or number of species used as food*

Food —Certain species are eaten by some of the lowest caste natives in India, and by many of the Burmese In the bazars of the latter country, boiled frogs are exposed for sale amongst other articles of food (*Mason*). FOOD 704

(*G Watt*)

FRUITS

705

st of Chamba, the
on passing
of Sikkim,

the period of pluck
natural flavour be

FRUIT-YIELDING PLANTS 706

*Achras Sapota, *Linn* , The Sapodilla Plum or Sapota. Sapotaceæ

*Adansonia digitata, *Linn.*, The Baobab Tree, Sour Gourd, Monkey-bread Malvaceæ.

Ægle Marmelos, *Correa* , The Bel or Bael Fruit. Rutaceæ

FRUITS.	The Chief Fruits of India.

FRUIT-YIELDING PLANTS.

*Ananas sativa, *Linn.;* THE PINE-APPLE. BROMELIACEÆ.

There are many forms of this fruit, and these improve in quality on passing eastward. They are fairly good in Bengal, but are excellent in Burma and the Malaya, where the plant seems to have become completely naturalised. Abul Fazl (in the *Ain-i-Akbari, p. 68*) alludes to the pine-apple calling it *Kat'hal-i-Safári* or the Jack fruit of travellers. And in the *Túzuk-i-Jahán-gíri* it is stated that the pine-apples at the time of Akbar's son came from the harbour towns of the Portuguese.

*Anona reticulata, *Linn.;* BULLOCK'S HEART. ANONACEÆ.

*A. squamosa, *Linn.* THE CUSTARD APPLE or SWEET SOP.

*Artocarpus incisa, *Linn.;* THE BREAD-FRUIT TREE. URTICACEÆ.

A. integrifolia, *Linn.* THE JACK-FRUIT:

An important fruit with the natives of the plains of India: rarely eaten by Europeans.

A. Lakoocha, *Roxb.* THE LAKUCHA.

*Averhoa Carambola, *Linn.;* THE KARMAL. GERANIACEÆ.

*A. Bilimbi, *Linn.* THE BILIMBI.

Bassia butyracea, *Roxb.*, SAPOTACEÆ.

B. latifolia, *Roxb.* THE BUTTER or MAHWA TREE.

The ripe corolla tubes constitute an important article of food with the people of the central table-land of India.

Borassus flabelliformis, *Linn.;* THE PALMYRA PALM. PALMÆ.

A common palm in Bengal and other parts of the plains. It produces its fruits in the cold season, in the interior of which exists a cold, insipid, gelatinous pellucid pulp eaten by the natives but only rarely by Europeans.

Capparis spinosa, *Linn.;* THE CAPER BERRY. CAPPARIDEÆ.

Carica Papaya, *L.;* THE PAPAW or PAPAYA TREE. PASSIFLOREÆ.

It is significant that it is not mentioned in the *Ain-i-Akbari*, a fact that fixes its introduction into India as after the reign of Akbar.

Carissa Carandas, *Linn.;* THE CARENJA FRUIT. APOCYNACEÆ.

The unripe fruit is pickled, the ripe fruit made into tarts.

Celtis australis, *Linn.;* URTICACEÆ.

Supposed by some to be the Lotus fruit of the ancients. *Conf.* with Diospyros Lotus, Vol. III., pp. 136—156.

Cephalandra indica, *Naud.;* CUCURBITACEÆ.

Citrullus Colocynthis, *Schrad.;* ENGLISH COLOCYNTH. CUCURBITACEÆ.

C. vulgaris, *Schrad.* THE WATER-MELON.

Var. fistulosus. THE TANDUS.

* Citrus Aurantium, *Linn.;* THE ORANGE. RUTACEÆ.

* C. decumana, *Willd.* THE SHADDOCK, or POMELO, or FORBIDDEN FRUIT.

C. Medica, *Linn.* THE CITRON, LEMON, LIME.

Var. 1.—Medica proper. The Citron.
Var. 2.—Limonum. The Lemon.
Var. 3.—acida. The Sour Lime of India.
Var. 4.—Limetta. The Sweet Lime.
Var. 5.—Lumia. The Sweet Lemon.

FRUIT-YIELDING PLANTS

Cordia Myxa, obliqua, and Rothii yield edible fruits often pickled In Sind C Rothii is viewed as a regular fruit tree

Cornus capitata, Wall, is generally classed as one of the Himálayan wild fruits, eaten and made into preserves

Cucumis Melo, *Linn*, THE MELON CUCURBITACEÆ
There are many forms of this fruit met with in India, some being used as dessert fruits, others as vegetables Dr Aitchison found the melon wild in Afghánistan

Cucurbita moschata, *Duchesne* THE MUSK MELON CUCURBITACEÆ
Eaten mostly as a vegetable

Cydonia vulgaris, *Tour*, THE QUINCE ROSACEÆ

Dillenia indica, *Linn*, THE CHALTA DILLENIACEÆ

Diospyros Kaki, *Linn f*, EBENACEÆ.
THE CHINESE FIG and PLUM, THE KEG FIG of JAPAN

D Lotus, *Linn* THE AMTOK or DATE PLUM
These and other species of Diospyros yield edible fruits, for which they are often cultivated

Durio Zibethinus, *DC*, DURIAN, or CIVET CAT FRUIT TREE MALVACEÆ

Elæagnus, ELÆAGNEÆ
One or two species of this genus are cultivated by the hill tribes, especially in Baluchistan They yield an edible fruit often known as the Wild Olive

* Eriobotrya japonica, *Lindl*, LOQUAT or JAPAN MEDLAR ROSACEÆ

Eugenia Jambolana, *Lam*, THE JAM MYRTACEÆ

E Jambos, *Linn* THE ROSE APPLE

Flacourtia Cataphracta, *Roxb* BIXINEÆ
Yields a fruit eaten by the natives It tastes like an inferior plum

* Ficus Carica, *Linn* THE COMMON FIG URTICACEÆ

Fragaria vesca, *Linn*, THE STRAWBERRY ROSACEÆ

Garcinia Cowa, *Roxb*, THE COWA FRUIT GUTTIFERÆ
This is a native of Eastern Bengal and yields an acid fruit which makes a remarkably fine preserve It ripens in the beginning of June

* G Mangostana, [illegible] THE MANGOSTEEN
[illegible] flavoured fruit [illegible] while it may be [illegible] fruit anywhere beyond the limits of Burma

Grewia asiatica, *L* THE PHALSA TILIACEÆ
A common wild tree which yields an edible fruit, often cultivated near villages on this account

Hibiscus Sabdariffa, *Linn* THE ROZELLE or INDIAN SORREL MALVACEÆ
There are two kinds, differing in the colour of the succulent calyx—red and white—which forms the edible part

* Lycopersicum esculentum, *Miller*, THE LOVE APPLE or TOMATO SOLANACEÆ.

FRUITS. | The Chief Fruits of India.

FRUIT-YIELDING PLANTS.

Mangifera fœtida, *Lour.;* ANACARDIACEÆ.

M. indica, *Linn.* THE MANGO TREE.

The number of cultivated and distinct forms of this fruit are probably as great as that of the European apple.

M. sylvatica, *Roxb.* THE WILD MANGO.

Mimusops hexandra, *Roxb.;* THE KHIRNI. SAPOTACEÆ.

Cultivated in Western India, especially at Goa, as a fruit. It is said to be agreeable and subacid.

Morus indica, *Linn.;* THE MULBERRY. URTICACEÆ.

A favourite fruit in many parts of India, but especially so with the hill tribes.

Musa paradisiaca, *Linn.;* THE PLANTAIN. SCITAMINEÆ.

M. sapientum, *Linn.* BANANA.

The number of Plantains and Bananas is very great. The reader is referred to the account of them given under Musa in another volume. The *chumpa* plantains of Bengal and Burma are perhaps the finest in flavour.

Myrica sapida, *Wall.;* THE KAPHUL. MYRICACEÆ.

A fruit of the Lower Himálaya and the Khasia Hills; ripening about May. Though largely eaten by the hill tribes the tree does not appear to be cultivated.

*Nephelium Litchi, *Camb.;* THE LITCHI. SAPINDACEÆ.

This tree is supposed to have been recently introduced into India from China. There are various forms, differing in thickness and flavour of pulp. The fruit comes into season in April and May. It succeeds best in the hot damp areas, such as in Bengal.

N. Longana, *Camb.* THE LONGAN FRUIT.

This fruit, which ripens about the end of June, is in Calcutta about the size and form of a marble, borne in great branches like grapes. The fleshy aril is, as in the Litchi, the edible portion.

* Olea europæa, *Linn.;* THE OLIVE. OLEACEÆ.

* Opuntia Dillenii, *Haw.;* THE PRICKLY PEAR. CACTEÆ.

* Passiflora'; PASSIFLOREÆ.

Several species of Passion-flower yield edible fruits—the GRANADILLA fruit—especially P. quadrangularis, P. laurifolia, and P. edulis. Though several species flower profusely on the Himálaya, none appear to be eaten in India.

* Phœnix dactylifera, *Linn.;* THE DATE PALM. PALMÆ.

P. sylvestris, *Roxb.* THE WILD DATE.

Phyllanthus Emblica, *Linn.;* THE EMBLIC MYROBALAN. EUPHORBIACEÆ.

Yields a useful fruit in the cold season which is pickled and made into jelly.

P. distichus, *Muell.;* THE OTAHEITE GOOSEBERRY.

Yields a fruit which, when cooked with sugar, greatly resembles green gooseberries. It is a native of India, though only rarely met with in cultivation.

* Physalis peruviana, *Linn.;* THE CAPE GOOSEBEERY or TIPÁRÍ. SOLANACEÆ.

Extensively cultivated in the plains of India and eaten in dessert or made into jam and chutney. Become quite acclimatised in some parts of the country.

The Chief Fruits of India. (G. Watt) **FRUITS.**

FRUIT-YIELDING PLANTS.

* Prunus armeniaca, *Linn*, THE APRICOT, MISHMUSH, or 'MOON OF THE FAITHFUL. ROSACEÆ.

* P. Avium, *Linn*, THE SWEET or BIRD CHERRY

* P. Cerasus, *Linn*, THE SOUR CHERRY

The *Flora of*
the North-West
feet Of P. Avi
has never seen it
Puddum, *Roxb*

* P. communis, *Huds.* THE PLUM.

Var. domestica. ALUCHA.

Var. Insititia. THE BOKHARA PLUM.

The plum, although most successfully grown in the gardens of Upper India, as Delhi, Saharanpur, &c, is much less successful on the plains than the peach On the Himálaya it also succeeds admirably and becomes of such flavour as to admit of its being classed as a dessert fruit. The plums of the plains make admirable preserves

* P. persica, *Benth & Hook*, THE PEACH

P. Puddum, *Roxb*

Commonly known as the WILD or HIMALAYAN CHERRY.

of cherry-brandy

Pyrus baccata, *Linn*, THE SIBERIAN CRAB ROSACEÆ.

P. communis, *Linn* THE COMMON PEAR

The hard round pear of the North-West Himálaya is quite distinct from the modernly introduced pyriform fruit, and it is probably an indigenous production In Kullu and other parts of the Himálaya large, yellow, soft, luscious pears are grown which compare favourably with any of the pears produced in Europe.

FRUITS. The Chief Fruits of India.

FRUIT-YIELDING PLANTS.

Pyrus Malus, *Linn.;* THE APPLE.

On the North-West Himálaya there are many forms of this fruit, some admittedly of modern introduction, and others, by Brandis, &c., spoken of as "apparently wild." The Afghan apple is a peculiar oblong fruit with pink marblings and wooly flavour. This is met with in many parts of the Western Himálaya, often becoming less than an inch in length, while preserving all its other characters. A flattened dark-green apple, which when ripe colours faintly on one side, is also frequent on the Himálaya occurring in the gardens of the poorest peasants, and forming a neglected shrub of enclosures. It is probable that these forms represent the so-called wild fruit, but the writer would be much more disposed to accept the round pear as indigenous, than to admit any of the apples as such. A small yellow pippin is common in Delhi, Saharanpur, and other Panjáb plains stations. It comes into season about April and May. At Kullu and also near Simla, large orchards have recently been established where apples, almost equal to the best produced in Europe, may now be purchased. The credit of having developed this new industry is mainly due to Sir E. C. Buck.

P. Pashia, *Ham.*

This indigenous plant (cultivated in Kullu and elsewhere on the Himálaya) yields a fruit which is edible on falling from the tree in an over-ripe state. (See Fungoid Pests, p. 457.)

* **Psidium Guyava**, *Raddi;* THE GUAVA TREE. MYRTACEÆ.

* **Punica Granatum**, *Linn.;* THE POMEGRANATE; GRENADES, *Fr.;* GRANATS, *Ger.*. LYTHRACEÆ.

Rhododendron arboreum, *Sm.;* ERICACEÆ.

The flowers of the tree Rhododendron are regularly collected and made into a pleasant subacid jelly. They appear in February to May.

Rhodomyrtus tomentosa, *Wight;* THE NILGHIRI HILL GOOSEBERRY. MYRTACEÆ.

This elegant shrub yields a berry which is largely collected and in South India is made into a jelly resembling apple jelly.

Ribes; SAXIFRAGACEÆ.

The Gooseberry and Currant, though wild plants on the Himálaya, do not appear to be cultivated.

Rubus; ROSACEÆ.

Various species of Bramble and Raspberry are collected from the wild source; none are cultivated like R. Idæus—the Raspberry—of Europe. R. ellipticus is the yellow raspberry, the fruits of which are collected and sold at bazárs on the Himálaya; it comes into season in May to June.

Sambucus nigra, *L.;* THE ELDER BERRY. CAPRIFOLIACEÆ.

Though two or three species of Elder occur on the Himálaya, they do not appear to have been grown for their berries, nor does the true Elder-berry appear to have been introduced.

Spondias dulcis, *Willd.;* THE OTAHEITE APPLE. ANACARDIACEÆ.

S. mangifera, *Pers.* THE HOG PLUM.

Tamarindus indica, *Linn.;* THE TAMARIND. LEGUMINOSÆ.

Triphasia trifoliata.

* **Vitis vinifera**, *Linn.;* THE GRAPE. AMPELIDEÆ.

The early records of Kashmír (such as the *Ain-i-Akbari*) shew that grape cultivation was once upon a time more extensive than at the present

day. The fruit is described, two centuries ago, as having been carried from the northern hilly tracts of India in basket loads and sold in the plains at R3 to 4 a basket At the present day the better class of grapes obtained in the plains of India are those imported by Kabul merchants, — FRUIT-YIELDING PLANTS.

Zizyphus Jujuba, *Lam*, THE BAER OR JUJUBE, THE CHINESE DATE RHAMNEÆ

Z vulgaris, *Lamk.*

The long or round plum, the *Kúl-phul*, is largely cultivated by the natives of the plains of India

For further information see NUTS

(*J. Murray*)

FUCUS.

The typical genus of the family FUCACEÆ belonging to the Natural Order ALGÆ. It is characterized by having plane, compressed, or linear fronds, generally of a brownish colour, which in some spec es grow to a great length The only two species which have been described as Indian are F nodosus and F vesiculosus.

Fucus amylaceus, *O'Sh* — 707

The name under which O Shaughnessy described and brought to notice the plant yielding the "CEYLON MOSS," *Gracilaria lichenoides*, *Grev* (*which see*)

F. nodosus, *Linn* — 708

THE KNOBBED SEA WRACK

Habitat.—A very common sea-weed in the northern temperate seas, said by Murray (*Plants and Drugs of Sind*) to be found commonly along the sea-shore

Similar in properties to the following species —

F. vesiculosus, *Linn*, *Bent & Trim*, *t 304* — 709

THE BLADDER WRACK

Syn —F SPIRALIS, *Linn*, F DIVARICATUS, *Linn*; F DISTICHUS, *Lightf*; F BALTICUS, *Ag* F PLATYCARPUS, *Thuret*

Habitat.—Very common on the shores of the United Kingdom, also along the North Atlantic Ocean, from Norway and Greenland to the West Indies, and on the North Pacific coast of America It is said by Murray in his *Plants and Drugs of Sind* to be found on the Manora Rocks

Medicine —The entire alga is used in the manufacture of a medicine Since the introduction of Iodine, however, it has gone greatly out of use, and is not now to be found in the British Pharmacopœia, nor in those of — MEDICINE. 710

FRUITS. | **The Chief Fruits of India.**

FRUIT-YIELDING PLANTS.

Pyrus Malus, *Linn.;* THE APPLE.

On the North-West Himálaya there are many forms of this fruit, some admittedly of modern introduction, and others, by Brandis, &c., spoken of as "apparently wild." The Afghan apple is a peculiar oblong fruit with pink marblings and wooly flavour. This is met with in many parts of the Western Himálaya, often becoming less than an inch in length, while preserving all its other characters. A flattened dark-green apple, which when ripe colours faintly on one side, is also frequent on the Himálaya occurring in the gardens of the poorest peasants, and forming a neglected shrub of enclosures. It is probable that these forms represent the so-called wild fruit, but the writer would be much more disposed to accept the round pear as indigenous, than to admit any of the apples as such. A small yellow pippin is common in Delhi, Saharanpur, and other Panjáb plains stations. It comes into season about April and May. At Kullu and also near Simla, large orchards have recently been established where apples, almost equal to the best produced in Europe, may now be purchased. The credit of having developed this new industry is mainly due to Sir E. C. Buck.

P. Pashia, *Ham.*

This indigenous plant (cultivated in Kullu and elsewhere on the Himálaya) yields a fruit which is edible on falling from the tree in an over-ripe state. (See Fungoid Pests, p. 457.)

* **Psidium Guyava**, *Raddi;* THE GUAVA TREE. MYRTACEÆ.

* **Punica Granatum**, *Linn.;* THE POMEGRANATE; GRENADES, *Fr.;* GRANATS, *Ger.* LYTHRACEÆ.

Rhododendron arboreum, *Sm.;* ERICACEÆ.

The flowers of the tree *Rhododendron* are regularly collected and made into a pleasant subacid jelly. They appear in February to May.

Rhodomyrtus tomentosa, *Wight;* THE NILGHIRI HILL GOOSEBERRY. MYRTACEÆ.

This elegant shrub yields a berry which is largely collected and in South India is made into a jelly resembling apple jelly.

Ribes; SAXIFRAGACEÆ.

The Gooseberry and Currant, though wild plants on the Himálaya, do not appear to be cultivated.

Rubus; ROSACEÆ.

Various species of Bramble and Raspberry are collected from the wild source; none are cultivated like **R. Idæus**—the Raspberry—of Europe. **R. ellipticus** is the yellow raspberry, the fruits of which are collected and sold at bazárs on the Himálaya; it comes into season in May to June.

Sambucus nigra, *L.;* THE ELDER BERRY. CAPRIFOLIACEÆ.

Though two or three species of Elder occur on the Himálaya, they do not appear to have been grown for their berries, nor does the true Elder-berry appear to have been introduced.

Spondias dulcis, *Willd.;* THE OTAHEITE APPLE. ANACARDIACEÆ.

S. mangifera, *Pers.* THE HOG PLUM.

Tamarindus indica, *Linn.;* THE TAMARIND. LEGUMINOSÆ.

Triphasia trifoliata.

* **Vitis vinifera**, *Linn.;* THE GRAPE. AMPELIDEÆ.

The early records of Kashmír (such as the *Ain-i-Akbari*) shew that grape cultivation was once upon a time more extensive than at the present

day. The fruit is described, two centuries ago, as having been carried from the northern hilly tracts of India in basket-loads and sold in the pla ns at R2 to 4 a basket ...

FRUIT-YIELDING PLANTS.

Zizyphus Jujuba, *Lam*, THE BAER OR JUJUBE, THE CHINESE DATE RHAMNEÆ

Z. vulgaris, *Lamk.*

The long or round plum, the *Kúl-phul*, is largely cultivated by the natives of the plains of India

For further information see NUTS

(*J. Murray*)

FUCUS.

The typical genus of the family FUCACEÆ belonging to the Natural ... ed, or linear ... to a great ... Indian are

Fucus amylaceus, *O'Sh* — 707

The name under which O Shaughnessy described and brought to notice the plant yielding the "CEYLON MOSS," Gracilaria lichenoides, *Grev* (*which see*)

F. nodosus, *Linn* — 708

THE KNOBBED SEA WRACK

Habitat.—A very common sea-weed in the northern temperate seas, said by Murray (*Plants and Drugs of Sind*) to be found commonly along the sea-shore

Similar in properties to the following species —

F. vesiculosus, *Linn*, *Bent & Trim*, *t 304* — 709

THE BLADDER WRACK

Syn —F SPIRALIS, *Linn*, F DIVARICATUS, *Linn*, F DISTICHUS, *Lightf*; F BALTICUS, *Ag* F PLATYCARPUS *Thuret*

Habitat —Very common on the shores of the United Kingdom, also along the North Atlantic Ocean, from Norway and Greenland to the West Indies, and on the North Pacific coast of America It is said by Murray in his *Plants and Drugs of Sind* to be found on the Manora Rocks

MEDICINE. 710

Medicine —The entire alga is used in the manufacture of a medicine Since the introduction of Iodine, however, it has gone greatly out of use, and is not now to be found in the British Pharmacopœia, nor in those of

CULTIVATION.

established they will perhaps begin to send out runners. Then it would be well to remove, though some persons are of opinion that the doing so causes a larger development of leaves than is favourable to the productiveness of the plant. By February they will have become good large plants, and may be expected then to be in full blossom."

The strawberry may be propagated either by seed or by rooted runners, but varieties can only be obtained from sports in seedlings or by hybridization.

Regarding its cultivation in Bombay, the Director of Land Records and Agriculture has furnished the following report, dated September 1889:—"Though it is much met with in gardens above the Ghâts it can only be successfully grown on the two hill stations of Mahábleshwar and Panchgani, where the fruit develops to a good size. The climate of the plains does not seem to agree with the plant. In Gondal and Kathiawár the plant was twice or thrice tried without success. Towards the end of 1887 about 2,000 strawberry plants were sent from Saharanpur to Mahábleshwar and were distributed amongst cultivators. The plants have taken kindly to the soil, and the plantations are in a flourishing condition. The cultivation of the strawberry has not, however, gone as yet beyond the experimental stage."

The history of the ready adaptability of **F. vesca** to the intense dry heat of the plains of Behar, the Central Provinces, and Upper India, and of the greatly increasing production of the fruit, encourages the hope that the cultivation of the strawberry, in the vicinity of hill stations, and of towns in the plains of which the climatic conditions are favourable, may become a large branch of market gardening. The outturn on even a very small area is very great in comparison to the outlay of money required; but the crop is one that absolutely demands a great deal of attention. It is said that in the Bombay Dekkan, where the plant is peculiarly difficult to grow, a bed of a few square yards will bring in from £15 to £20 the season.

It also appears probable, when one considers the history of the cultivated strawberry in Europe, that a judicious system of crossing the indigenous **F. vesca** with European stock, or with the fine large **F. nilgerrensis**, might produce varieties of fruit in no way inferior to those obtained in Europe.

The success that has already attended the efforts of private and market gardeners in many parts of the country, perhaps especially in the large strawberry gardens at Siri near Simla, ought to encourage similar endeavours on the part of Natives near other large centres of demand.

Francœuria crispa, *Cass.*; see **Pulicaria crispa**, *Benth.*; COMPOSITÆ.

Frankincense, see **Boswellia**, Vol. I., 511.

FRAXINUS, *Linn.*; *Gen. Pl.*, *II.*, 676.

A genus of trees consisting of 30 species found in the north temperate regions of both hemispheres, of which 4 are natives of India.

685

Fraxinus excelsior, *Linn.*; *Fl. Br. Ind.*, *III.*, 606; OLEACEÆ.

THE COMMON ASH.

Syn.—F. HETEROPHYLLA, *Vahl.*; F. MOORCROFTIANA, *Wall.*; ORNUS MOORCROFTIANA, *G. Don.*

Vern.—*Súm, kúm*, PB.

References.—*Brandis, For. Fl.*, 303; *Gamble, Man. Timb.*, 256; *Pharm. Ind.*, 136; *Ainslie, Mat. Ind.*, *I.*, 209; *O'Shaughnessy, Beng. Dispens.*, 435; *Flück. & Hanb.*, *Pharmacog.*, 409.

Habitat.—A large tree of the temperate West Himalaya and Western Tibet from 4 000 to 9,000 feet, distributed from the Caucasus westward to Britain (*Fl Br Ind*)

According to Brandis "Basin of the Jhelam, Chenab and Ravi rivers, between 4,000 and 6,000 feet'

CULTIVATION 686

Cultivation—Brown, in his *Forester* (*page 193*), gives the following description of the propagation and cultivation of the Ash in England —

"It is propagated by seeds, and varieties are extended by grafting and budding on [illegible]

what are termed [illegible]

seeds and sand should be turned over every three months The mass [illegible]

sure to come up thickly [illegible] one seed to every three square inches, and the covering of earth should not exceed ¾ inch In the following spring the plants will be ready for *being transplanted into the nursery rows which may be 15 inches from* one another, and 4 inches plant from plant n the rows

"When the plants have stood two years in the nursery rows they may be removed into the forest ground, but if wanted of a larger size they may be left a year longer

"The ash is in all respects a hardy tree and accommodates itself to most soils and situations not too high lying and exposed, but to grow it to large dimensions of timber, and to have that of good quality, the tree must be planted in a rather low-lying situation and on a strong loamy soil, but not a retentive one, nor on one wet in the sub soil There is no situation so well fitted for the profitable growth of the ash as the sides of ravines having a good strong loamy soil where there is a constant [illegible]

MEDICINE
Manna. 687
Bark 688
Leaves. 689
TIMBER 690

It is of very great value on account of its toughness and elasticity, which renders it highly useful for such purposes as the making of wheels, [illegible]

would seem no very great reason why the Ash should not become an important cultivated timber in this country.

FOOD. 601

Food.—The fruit in England is preserved in vinegar as a pickle.

DOMESTIC. 602

Domestic, &c.—The ash coppices well (*Brandis*).

693

Fraxinus floribunda, *Wall.; Fl. Br. Ind., III., 605.*

Syn.—FRAXINUS UROPHYLLA, *Wall.*; ORNUS FLORIBUNDA, *Dietr.*; O. UROPHYLLA, *G. Don.*

Vern.—*Kangu, tuhasi*, NEPAL; *Angan, angú, dakkúri*, N.-W. P.; *Angú, súm, sunnu, shun, hum, hamer, túnnú*, PB.; *Banarish*, AFG.

References.—*Brandis, For. Fl., 302; Gamble, Man. Timb., 256; Stewart, Pb. Pl., 138; Ainslie, Mat. Ind., I., 209; O'Shaughnessy, Beng. Dispens., 434; Atkinson, Him. Dist., 737; Gazetteers:—Rawalpindi Dist., 15; N.-W. P., X., 313; Gurdaspur Dist., 55; Hazara Dist., 14; Indian Forester, VI., 136; IX., 290; X, 317; XIII., 67.*

Habitat.—A large deciduous tree of the Himálaya, from the Indus to Sikkim, between 5,000 and 8,500 feet.

MEDICINE. Manna. 694

Medicine.—A concrete, saccharine exudation (manna) is obtained from the stem, by incision, and is employed as a substitute for the officinal manna. The sugar contained in this exudation, called mannite, differs from cane and grape sugar in not being readily fermentable; though under certain conditions it does ferment, yielding a quantity of alcohol varying from 13 to 33 per cent. (*Dr. Warden*). Like the officinal manna, this is used for its sweetening and slightly laxative properties.

TIMBER. 695

Structure of the Wood.—White, with a light-red tinge, no heartwood, soft to moderately hard. Weight 48lb per cubic foot. It is very similar in structure to the wood of the European ash, from which, however, it differs in having no heartwood.

It is very valuable, possessing most of the qualities of European ash, and is used for oars, jampan poles, ploughs, platters, spinning-wheels, and other purposes.

The Conservator of Forests, Panjáb, writes: "In 1879 samples were supplied to the Timber Ordnance Agent, Fattehgarh, for sponge staves."

606

F. ornus, *Linn.; DC., Prodr., VIII., 274.*

THE FLOWERING ASH.

Syn.—ORNUS EUROPÆA, *Pers.*

This, though not an Indian species, may be briefly considered, as it is the principal source of the drug known officinally in Europe as "Manna." **F. rotundifolia** and **F. excelsior** are, however, to a smaller extent also manna-yielding ashes.

Vern.—*Shir-khist*, HIND.; *Shir-khist*, DEC.; *Mená*, TAM., TEL.; *Manna*, MALAY; *Mann, shir-khisht*, ARAB.; *Shir khisht*, PERS.

References.—*Pharm. Ind., 136; Ainslie, Mat. Ind., I., 208; O'Shaughnessy, Beng. Dispens., 434; Flück. and Hanb., Pharmacog., 409; Irvine, Mat. Med., Patna, 101; Birdwood, Bomb. Pr., 52; Smith, Dic., 26; Kew Off. Guide to the Mus. of Ec. Bot., 94.*

Habitat.—A small tree of the mountains of South Europe and Asia Minor, extending in the Mediterranean region westwards to Corsica and Eastern Spain.

MEDICINE. Manna. 697

Medicine.—The name MANNA is applied to the saccharine exudation obtained, by incision, from this tree as well as to other substances. Originally the name was applied to the miraculous food provided for the Israelites during their journey from Egypt, but since then it has come to be used for most saccharine exudations. The officinal manna of European medicine is the production of the three species of ash above mentioned, principally of **F. ornus**, and is frequently known from that circumstance as Calabrian manna. It appears that the manna of Indian medi-

MEDICINE Imported manna. 698

cine is derived from a wholly different source The true *shir khist* of the bazárs of North-Western India is imported from Afghánistan, Turkestan, and Persia, and is probably the exudation of Cotoneaster nummularia, and to a lesser extent of Araphaxis spinosa Fluckiger and Hanbury have examined fragments of this *shir-khist* and pronounce it to be indisputably derived from Cotoneaster They write 'It is in irregular roundish tears, from about ¼ up to ¾ inch in greatest length of an

Indigenous manna 699

There is however, a certain amount of manna obtained in India from

at present investigated Dr Dymock to whom a specimen has samples have been sent has obligingly drawn the writer's attention to an interesting passage in the *Makhzan-el-Ad*
Shir-khisht writes, "and they sa
Behar, Patna, and Bhágulpur, a
from a plant, called, in Hindi,
manner the tree is cut down a
causes a flow of boiling juice whic
sugar sweetmeats, and this sugar has all the properties of the *shir khisht Harlalu* Hakim Mir Muhammad Abdul Hamid writes, 'I have myself used it as *Shir-khisht*'"

The manna alluded to in the above passage cannot possibly be the substance obtained from the Central Provinces, which is evidently a natural exudation, which, falling in a shower, incrustates leaves, twigs,
lded
As
f the
ing
manna from the tips of the twigs which, cementing the needles into clotted masses, and melting through the heat of the sun, has encrusted

adulterating honey

* Dymock reports that it does not appear to agree with any known manna It, however contains glucose and a crystalline sugar like mannite

† Rhododendron arboreum has since been observed to be exuding manna as a result of Aphides

Dr. Ainslie writes: "The Hindus know and care little about manna; the Muhammadans of India prescribe it as a laxative to children and delicate women, in doses from ʒ 2 to ℥ ½; and the Arabians give it a place amongst their *Mushilat-sufra* (cholagogues)."

700

Fraxinus xanthoxyloides, *Wall.; Fl. Br. Ind., III., 606.*

Syn.—F. MOORCROFTIANA, *Brand.*; ORNUS XANTHOXYLOIDES, *G. Don.*

Vern.—*Auga, gaha,* N.-W. P.; *Hannu, nuch, shilli, chuj, thum, shangal, kanôch, hanôch,* PB.; *Shang, hagai,* PUSHTU.

References.—*Brandis, For. Fl., 304; Gamble, Man. Timb., 256; Stewart, Pb. Pl., 139; Atkinson's Flora of the Kuram Valley, 79; Baden Powell, Pb. Pr., 581; Balfour, Cyclop., I., 1151; Indian Forester, V., 185, 478; Rawalpindi Gazetteer, 15; Simla Gazetteer, 11.*

Habitat.—A small tree, or more often a shrub, met with in Afghánistán, the Trans-Indus, and from the Jhelum to Kumaon in the North-West Provinces (*Gamble*). Aitchison in his *Kuram Valley Flora* mentions it as being found on the ascent to Péwar Kotal, and occasionally all over the Hariab district to Drékalla and Kárátigah. Brandis gives its distribution as the North-Western Himálaya from Kashmír to Kumaon, between 3,000 and 9,000 feet, and Lace mentions the shrub as growing near Quetta.

TIMBER. 701

Structure of the Wood.—A good elastic wood of small size, suitable for staves, jampan poles, walking-sticks, and employed for making ploughs in Kághán (*Baden Powell*). Used for agricultural implements (*Lace, Quetta*).

FODDER. 702

Fodder.—Dr. Stewart says its leaves are used as fodder, and Mr. Lace writes that in Southern Afghanistan the tree is never allowed to attain full size, owing to its young branches being continually lopped and the leaves given to sheep and goats, which are very fond of them.

French Bean, see Dolichos Lablab, pp. 184, 185, also Phaseolus.

703

French Honeysuckle, see Hedysarum coronarium, *Linn.*; LEGUMINOSÆ.

FROGS.

Vern.—*Renak,* HIND; *Bheng,* BENG.

Amphibians of the sub-class BATRACHIA and order ANURA, of which they constitute the family RANIDÆ. They occur very commonly in all parts of India, and are especially noticeable during the rains, when their deafening croaking resounds on all sides. Several species are peculiar to definite localities, and many are characterised by the peculiar sounds they produce. Amongst these one may be noticed, an inhabitant of the Khasia Hills, which has a croak so exactly similar to the tinkling of a hammer on an anvil, that even some of the most accurate observers appear to have been deceived by it (*Him. Journ., II., 295*). But perhaps the most amusing record of frogs in Indian literature occurs in the *Ain-i-Akbari,* the writer of which remarks: "Frogs also may be trained to catch sparrows. This looks very funny." Adams, in his *Wanderings of a Naturalist in India,* mentions that at Poona having shot a sun-bird which fell on the margin of a pool, he saw it seized and devoured by a large green frog. This lends a certain support to the somewhat extraordinary statement made by Abul Fazl. Mr. Edgar Thurston, the Superintendent of the Central Museum, Madras, in a recent exhaustive monograph on the Batrachia, Salientia, and Apoda of Southern India, has described six genera as natives of that region and Ceylon; *viz.,* 1, Rana; 2, Rhacophorus; 3, Ixalus; 4, Nyctibatrachus; 5, Nannobatrachus; and 6, Nannophrys; of which the first comprises 19; the second 14; the third 19; the fourth 2; the fifth 1; and the sixth 2 species. Scientific information regarding the occurrence and distribution of the species of

this family in other parts of India appears to be meagre nor is there any record of the exact species, or number of species used as food

FOOD 704

Food.—Certain species are eaten by some of the lowest caste natives in India, and by many of the Burmese In the bazars of the latter country, boiled frogs are exposed for sale amongst other articles of food (*Mason*).

(*G Watt*)

FRUITS

705

The fruits of the East, it is believed, are much overrated in Europe Many of the best of Indian fruits have been introduced from Europe, China, the West Indies, and America The most characteristic modern fruits of India are the mango, guava, lichi, pine apple, and plantain. The mangosteen is common in the Straits, and is regarded as the most delicately-flavoured fruit of the East

It is remarkable that while the wild forms of many of the fruits of Europe

a soft pinkish separable pulp They reach the market just before the mangos, or at the beginning of the hot season In the Panjáb this soft condition is rarely attained, and the pulp adheres firmly to the stone,

Afghán apricot Even at Simla, only a few miles east of Chamba, the apricots are very inferior, and this degeneration increases on passing ... Sikkim,

able trade is, howe

*Achras Sapota, *Linn*, The Sapodilla Plum or Sapota. Sapotaceæ.
*Adansonia digitata, *Linn*,
The Baobab Tree, Sour Gourd, Monkey-bread. Malvaceæ.
Ægle Marmelos, *Correa*, The Bel or Bael Fruit. Rutaceæ.

FRUIT-YIELDING PLANTS 706

FRUITS.

The Chief Fruits of India.

FRUIT-YIELDING PLANTS.

*Ananas sativa, *Linn.;* THE PINE-APPLE. BROMELIACEÆ.

There are many forms of this fruit, and these improve in quality on passing eastward. They are fairly good in Bengal, but are excellent in Burma and the Malaya, where the plant seems to have become completely naturalised. Abul Fazl (in the *Ain-i-Akbari, p. 68*) alludes to the pine-apple calling it *Kat'hal-i-Safárí* or the Jack fruit of travellers. And in the *Túzuk-i-Jahán-gírí* it is stated that the pine-apples at the time of Akbar's son came from the harbour towns of the Portuguese.

*Anona reticulata, *Linn.;* BULLOCK'S HEART. ANONACEÆ.

*A. squamosa, *Linn.* THE CUSTARD APPLE or SWEET SOP.

*Artocarpus incisa, *Linn.*; THE BREAD-FRUIT TREE. URTICACEÆ.

A. integrifolia, *Linn.* THE JACK-FRUIT:

An important fruit with the natives of the plains of India: rarely eaten by Europeans.

A. Lakoocha, *Roxb.* THE LAKUCHA.

*Averhoa Carambola, *Linn.*; THE KARMAL. GERANIACEÆ.

*A. Bilimbi, *Linn.* THE BILIMBI.

Bassia butyracea, *Roxb.*, SAPOTACEÆ.

B. latifolia, *Roxb.* THE BUTTER or MAHWA TREE.

The ripe corolla tubes constitute an important article of food with the people of the central table-land of India.

Borassus flabelliformis, *Linn.*; THE PALMYRA PALM. PALMÆ.

A common palm in Bengal and other parts of the plains. It produces its fruits in the cold season, in the interior of which exists a cold, insipid, gelatinous pellucid pulp eaten by the natives but only rarely by Europeans.

Capparis spinosa, *Linn.*; THE CAPER BERRY. CAPPARIDEÆ.

Carica Papaya, *L.*; THE PAPAW or PAPAYA TREE. PASSIFLOREÆ.

It is significant that it is not mentioned in the *Ain-i-Akbari,* a fact that fixes its introduction into India as after the reign of Akbar.

Carissa Carandas, *Linn.*; THE CARENJA FRUIT. APOCYNACEÆ.

The unripe fruit is pickled, the ripe fruit made into tarts.

Celtis australis, *Linn.*; URTICACEÆ.

Supposed by some to be the Lotus fruit of the ancients. *Conf.* with Diospyros Lotus, Vol. III., pp. 136—156.

Cephalandra indica, *Naud.*; CUCURBITACEÆ.

Citrullus Colocynthis, *Schrad.;* ENGLISH COLOCYNTH. CUCURBITACEÆ.

C. vulgaris, *Schrad.* THE WATER-MELON.
Var. fistulosus. THE TANDUS.

* Citrus Aurantium, *Linn.;* THE ORANGE. RUTACEÆ.

* C. decumana, *Willd.* THE SHADDOCK, or POMELO, or FORBIDDEN FRUIT.

C. Medica, *Linn.* THE CITRON, LEMON, LIME.
Var. 1.—Medica proper. The Citron.
Var. 2.—Limonum. The Lemon.
Var. 3.—acida. The Sour Lime of India.
Var. 4.—Limetta. The Sweet Lime.
Var. 5.—Lumia. The Sweet Lemon.

F. 706

The Chief Fruits of India. (*G Watt*) | FRUITS.

FRUIT-YIELDING PLANTS.

Cordia Myxa, obliqua, and Rothii yield edible fruits often pickled In Sind C. Rothii is viewed as a regular fruit tree

Cornus capitata, *Wall*, is generally classed as one of the Himálayan wild fruits, eaten and made into preserves

Ct

Cucurbita moschata, *Duchesne*, THE MUSK MELON CUCURBITACEÆ
Eaten mostly as a vegetable

Cydonia vulgaris, *Tour*, THE QUINCE ROSACEÆ

Dillenia indica, *Linn*, THE CHALTA DILLENIACEÆ

Diospyros Kaki, *Linn f*, EBENACEÆ.
THE CHINESE FIG and PLUM, THE KEG FIG of JAPAN

D Lotus, *Linn* THE AMTOK or DATE PLUM
These and other species of Diospyros yield edible fruits, for which they are often cultivated

Durio Zibethinus, *DC*, DURIAN, or CIVET-CAT FRUIT-TREE MALVACEÆ

Elæagnus; ELÆAGNEÆ.
One or two species of this genus are cultivated by the hill tribes, especially in Baluchistan They yield an edible fruit often known as the Wild Olive

* Eriobotrya japonica, *Lindl*, LOQUAT or JAPAN MEDLAR ROSACEÆ

Eugenia Jambolana, *Lam*, THE JAM MYRTACEÆ

E Jambos, *Linn* THE ROSE-APPLE

Flacourtia Cataphracta, *Roxb*, BIXINEÆ
Yields a fruit eaten by the natives It tastes like an inferior plum

* Ficus Carica, *Linn*, THE COMMON FIG URTICACEÆ

Fragaria vesca, *Linn*, THE STRAWBERRY. ROSACEÆ

Garcinia Cowa, *Roxb* THE COWA FRUIT GUTTIFERÆ
This is a native of Eastern Bengal and yields an acid fruit which makes a remarkably fine preserve It ripens in the beginning of June

* C

deliciously flavoured fruit insula, and while it may be duce good fruit anywhere beyond the limits of Burma

Grewia asiatica, *L.*, THE PHALSA TILIACEÆ
A common wild tree which yields an edible fruit, often cultivated near villages on this account

Hibiscus Sabdariffa, *Linn*, THE ROZELLE or INDIAN SORREL MALVACEÆ
There are two kinds, differing in the colour of the succulent calyx—red and white—which forms the edible part

* Lycopersicum esculentum, *Miller*, THE LOVE APPLE or TOMATO SOLANACEÆ.

FRUITS.

The Chief Fruits of India.

FRUIT-YIELDING PLANTS.

Mangifera fœtida, *Lour.*; ANACARDIACEÆ.

M. indica, *Linn.* THE MANGO TREE.

The number of cultivated and distinct forms of this fruit are probably as great as that of the European apple.

M. sylvatica, *Roxb.* THE WILD MANGO.

Mimusops hexandra, *Roxb.*; THE KHIRNI. SAPOTACEÆ.

Cultivated in Western India, especially at Goa, as a fruit. It is said to be agreeable and subacid.

Morus indica, *Linn.*; THE MULBERRY. URTICACEÆ.

A favourite fruit in many parts of India, but especially so with the hill tribes.

Musa paradisiaca, *Linn.*; THE PLANTAIN. SCITAMINEÆ.

M. sapientum, *Linn.* BANANA.

The number of Plantains and Bananas is very great. The reader is referred to the account of them given under Musa in another volume. The *chumpa* plantains of Bengal and Burma are perhaps the finest in flavour.

Myrica sapida, *Wall.*; THE KAPHUL. MYRICACEÆ.

A fruit of the Lower Himálaya and the Khasia Hills; ripening about May. Though largely eaten by the hill tribes the tree does not appear to be cultivated.

*Nephelium Litchi, *Camb.*; THE LITCHI. SAPINDACEÆ.

This tree is supposed to have been recently introduced into India from China. There are various forms, differing in thickness and flavour of pulp. The fruit comes into season in April and May. It succeeds best in the hot damp areas, such as in Bengal.

N. Longana, *Camb.* THE LONGAN FRUIT.

This fruit, which ripens about the end of June, is in Calcutta about the size and form of a marble, borne in great branches like grapes. The fleshy aril is, as in the Litchi, the edible portion.

* Olea europæa, *Linn.*; THE OLIVE. OLEACEÆ.

* Opuntia Dillenii, *Haw.*; THE PRICKLY PEAR. CACTEÆ.

* Passiflora'; PASSIFLOREÆ.

Several species of Passion-flower yield edible fruits—the GRANADILLA fruit—especially P. quadrangularis, P. laurifolia, and P. edulis. Though several species flower profusely on the Himálaya, none appear to be eaten in India.

* Phœnix dactylifera, *Linn.*; THE DATE PALM. PALMÆ.

P. sylvestris, *Roxb.* THE WILD DATE.

Phyllanthus Emblica, *Linn.*; THE EMBLIC MYROBALAN. EUPHORBIACEÆ.

Yields a useful fruit in the cold season which is pickled and made into jelly.

P. distichus, *Muell.*; THE OTAHEITE GOOSEBERRY.

Yields a fruit which, when cooked with sugar, greatly resembles green gooseberries. It is a native of India, though only rarely met with in cultivation.

* Physalis peruviana, *Linn.*; THE CAPE GOOSEBERRY or TIPÁRÍ. SOLANACEÆ.

Extensively cultivated in the plains of India and eaten in dessert or made into jam and chutney. Become quite acclimatised in some parts of the country.

The Chief Fruits of India. (G. Watt) | FRUITS

FRUIT-YIELDING PLANTS.

* Prunus armeniaca, *Linn.* THE APRICOT, MISHMUSH, or 'MOON OF THE FAITHFUL ROSACEÆ

* P. Avium, *Linn.* THE SWEET or BIRD CHERRY

* P. Cerasus, *Linn* THE SOUR CHERRY
The *Flora of British India* states that both species of cherry occur on the North-West Himalaya in a state of cultivation at altitudes up to 8,000 feet Of P. Avium it is added that it is almost naturalised The writer has never seen it except in gardens, and the Himalayan wild cherry is P. Puddum, *Roxb*

* P. communis, *Huds* THE PLUM.
Var domestica ALUCHA
Var. Insititia. THE BOKHARA PLUM.

Indi
thar
of s
plums of the plains make admirable preserves

* P. persica, *Benth & Hook.* THE PEACH

P. Puddum, *Roxb*

yellow, orange or pink fruits in March These are not or only rarely eaten by the Natives, but are sold to the Europeans to be used in the preparation of cherry-brandy

Pyrus baccata, *Linn.* THE SIBERIAN CRAB ROSACEÆ

P. communis, *Linn* THE COMMON PEAR
The hard round pear of the North West Himálaya is quite distinct from the modernly introduced pyriform fruit, and it is probably an indigenous production In Kullu and other parts of the Himálaya large, yellow soft, luscious pears are grown which compare favourably with any of the pears produced in Europe

FRUITS.

The Chief Fruits of India.

FRUIT-YIELDING PLANTS.

Mangifera fœtida, *Lour.*; ANACARDIACEÆ.

M. indica, *Linn.* THE MANGO TREE.

The number of cultivated and distinct forms of this fruit are probably as great as that of the European apple.

M. sylvatica, *Roxb.* THE WILD MANGO.

Mimusops hexandra, *Roxb.*; THE KHIRNI. SAPOTACEÆ.

Cultivated in Western India, especially at Goa, as a fruit. It is said to be agreeable and subacid.

Morus indica, *Linn.*; THE MULBERRY. URTICACEÆ.

A favourite fruit in many parts of India, but especially so with the hill tribes.

Musa paradisiaca, *Linn.*; THE PLANTAIN. SCITAMINEÆ.

M. sapientum, *Linn.* BANANA.

The number of Plantains and Bananas is very great. The reader is referred to the account of them given under Musa in another volume. The *chumpa* plantains of Bengal and Burma are perhaps the finest in flavour.

Myrica sapida, *Wall.*; THE KAPHUL. MYRICACEÆ.

A fruit of the Lower Himálaya and the Khasia Hills; ripening about May. Though largely eaten by the hill tribes the tree does not appear to be cultivated.

*Nephelium Litchi, *Camb.*; THE LITCHI. SAPINDACEÆ.

This tree is supposed to have been recently introduced into India from China. There are various forms, differing in thickness and flavour of pulp. The fruit comes into season in April and May. It succeeds best in the hot damp areas, such as in Bengal.

N. Longana, *Camb.* THE LONGAN FRUIT.

This fruit, which ripens about the end of June, is in Calcutta about the size and form of a marble, borne in great branches like grapes. The fleshy aril is, as in the Litchi, the edible portion.

* Olea europæa, *Linn.*; THE OLIVE. OLEACEÆ.

* Opuntia Dillenii, *Haw.*; THE PRICKLY PEAR. CACTEÆ.

* Passiflora'; PASSIFLOREÆ.

Several species of Passion-flower yield edible fruits—the GRANADILLA fruit—especially P. quadrangularis, P. laurifolia, and P. edulis. Though several species flower profusely on the Himálaya, none appear to be eaten in India.

* Phœnix dactylifera, *Linn.*; THE DATE PALM. PALMÆ.

P. sylvestris, *Roxb.* THE WILD DATE.

Phyllanthus Emblica, *Linn.*; THE EMBLIC MYROBALAN. EUPHORBIACEÆ.

Yields a useful fruit in the cold season which is pickled and made into jelly.

P. distichus, *Muell.*; THE OTAHEITE GOOSEBERRY.

Yields a fruit which, when cooked with sugar, greatly resembles green gooseberries. It is a native of India, though only rarely met with in cultivation.

* Physalis peruviana, *Linn.*; THE CAPE GOOSEBEERY or TIPÁRÍ. SOLANACEÆ.

Extensively cultivated in the plains of India and eaten in dessert or made into jam and chutney. Become quite acclimatised in some parts of the country.

FRUIT-YIELDING PLANTS.

* Prunus armeniaca, *Linn*., THE APRICOT, MISHMUSH, or 'MOON OF THE FAITHFUL. ROSACEÆ

* P. Avium, *Linn*., THE SWEET or BIRD CHERRY.

* P. Cerasus, *Linn*., THE SOUR CHERRY
The *Flora of* [illegible]
the North-West
feet Of P Avi
has never seen it
Puddum, *Roxb*

* P. communis, *Huds*. THE PLUM.
Var. domestica ALUCHA
Var. insititia THE BOKHARA PLUM.
The plum, although most successfully grown in the gardens of Upper India, as Delhi, Saharanpur, &c, is much less successful on the plains than the peach On the Himálaya it also succeeds admirably and becomes of such flavour as to admit of its being classed as a dessert fruit. The plums of the plains make admirable preserves

* P. persica, *Benth & Hook*., THE PEACH
The peach has a greater [illegible]

[illegible]

also common, but, what is perhaps more significant, the green semi-wild fruit of the Himálayas is a *clingstone* fruit, while that of the greater part of the plains and Nilghiri hills is *freestone*

P. Puddum, *Roxb*
Common! [illegible]

[illegible] of cherry-brandy

Pyrus baccata, *Linn*., THE SIBERIAN CRAB ROSACEÆ

P. communis, *Linn* THE COMMON PEAR
The hard round pear of the North-West Himálaya is quite distinct from the modernly introduced pyriform fruit, and it is probably an indigenous production In Kullu and other parts of the Himálaya large, yellow, soft, luscious pears are grown which compare favourably with any of the pears produced in Europe

India and the United States. To the natives of India the plant as a medicinal substance is unknown. Its therapeutic properties are very similar to those of iodine, being deobstruent, and considered of specific value in scrofulous affections, rheumatism, and glandular swellings, particularly goitre.

In 1862, Dr. Duchesne Dupare described it as having a marked effect in diminishing obesity, and it is said to be an ingredient in the extensively-advertised nostrum,—"Anti-Fat." In Europe this plant for a long time formed a considerable source of soda alkalis, but its importance for this purpose has diminished in recent years. Its principal value is now in the manufacture of IODINE and BROMINE, as it with F. nodosus forms the grearter part of the sea-weed burned to form KELP.

Iodine. 711 Bromine. 712 Kelp. 713

Fodder and Manure.—It is said by Greville to form an article of FODDER and SHEEP FOOD in some of the islands of Scotland. It is also a valuable MANURE.

FODDER. 714 MANURE. 715

It is possible that both species of Fucus may be found in greater quantity than is generally known along the northern shores of the Indian Ocean, in which case it is well to remember their important economic properties.

FUEL & FIREWOOD.

716

With very few exceptions all the timber trees of India might be used as firewood. Certain timbers, however, emit an objectionable odour, and on that account are rarely used; others are too valuable. The heat-giving property is a point of great importance in fuel-supply, and it seems probable that a thorough investigation of the heat evolved from given weights of timber would greatly narrow the list of plants which should be enumerated as suitable for steam purposes, whether railway or machinery.

FUEL AND FIREWOOD. TIMBERS, &c., USED FOR—

Abies Smithiana (=Picea Morinda).
Acacia arabica.
A. Catechu (firewood for steamers).
A. leucophlœa.
A. melanoxylon.
A. planifrons.
Adhatoda Vasica (brick-burning).
Adina sessilifolia.
Ægiceras corniculata.
Alangium Lamarckii.
Albizzia amara.
Amoora cucullata.
Anogeissus latifolia.
Avicennia officinalis.
Balanites Roxburghii.
Berberis aristata.
B. vulgaris.
Betula cylindrostachys.
Boswellia serrata.
B. thurifera.
Briedelia stipularis.
Bruguiera gymnorhiza.
Calligonum polygonoides.
Capparis aphylla.
Carissa diffusa.
Cassia siamea (Ceylon locomotive fuel).
Castanopsis tribuloides.
Casuarina equisetifolia.
Ceratonia Siliqua.
Cerbera Odollam.
Ceriops Candolleana.
Cordia Myxa.
C. Rothii.
Coriaria nepalensis.
Cornus capitata.
Croton caudatus.
Crypteronia paniculata.
Cynometra ramiflora.
Dalbergia Sissoo (Railway fuel).
Dillenia indica.
Ekebergia indica.
Elæagnus hortensis.
Ephedra vulgaris.
Eucalyptus Globulus.
Eurya japonica.
E. symplocina.
Excæcaria Agallocha.
E. indica.
Ficus religiosa.
F. retusa.
Fraxinus xanthoxyloides
Garuga pinnata.
Helicteres Isora.

TIMBERS USED FOR FUEL AND FIREWOOD.

Heritiera littoralis.
Hibiscus tiliaceus.
Hippophæ rhamnoides.
Hydnocarpus alpina.
Juniperus communis.
J. excelsa.
J. recurva.
Kandelia Rheedii.
Lebedieropsis orbicularis.
Lonicera quinquelocularis.
Lumnitzera racemosa.
Lycium europæum.
Mæsa montana.
Mallotus philippinensis.
Meliosma Wallichii.
Mimosa dulcis.
Myricaria elegans.
M. germanica.
Myrsine semiserrata.
Nyctanthes Arbor-tristis.
Olea ferruginea.
Phyllanthus Emblica.
Pieris ovalifolia.
Pinus longifolia (bark as fuel).
Pithecolobium dulce.
Pongamia glabra.
Populus balsamifera.
P. euphratica.
Premna integrifolia.
P. latifolia.
Premna mucronata
Prinsepia utilis.
Prosopis spicigera.
Prunus armenica.
Pygeum zeylanicum.
Quercus acuminata.
Q. Ilex.
Q. incana
Q. lanuginosa.
Q. semecarpifolia.
Randia dumetorum.
Rhamnus virgatus.
Rhazya stricta.
Rhododendron arboreum.
Rhus mysorensis.
Salix (species)
Salvadora oleoides.
S. persica.
Securinega leucopyrus.
Sesbania ægyptiaca.
S. grandiflora.
Sonneratia acida.
Streblus asper.
Symplocus lucida.
Tamarix dioica.
Taxus baccata (burnt as incense)
Terminalia tomentosa.
Teucrium macrostachyum.
Xylosma longifolium.
Zizyphus rugosa.

FULLER'S EARTH; *Ball.; In. Man. Geol. of India, Vol. III., 570.*

The following brief note on this subject has been obligingly furnished by Mr. H. B. Medlicott for this work :—

Fuller's earth.

717

TERRE À FOULON, *Fr.*; WALKERERDE, *Ger.*; CRETA DA SODARE I PANNI, *Ital*

Range: the so-called *Multani-mitti* imported into [illegible] is of [illegible] qualities :—

(1) White mitti, called "*khajrú*," or edible, from Bikanír and Jessalmír; 718
(2) Yellow mitti, or "*bhakri*," for dyeing cloths, from the same localities; 719
(3) Light green or "*sabus mitti*," for cleaning the hair, from Vadur in the Dera Ghazi Khan district. 720

At Nilawan, in the Salt Range, a lavender-coloured clay or decomposed rock, which is found with volcanic rock at the above locality, is used as fuller's earth by the natives. The reader is referred for further information to the article CLAY (Vol. II., pp. 360—368, but especially paragraph No. 1319 on *Edible and Medicinal Earths*).

Fulwa Butter, see Bassia butyracea, *Roxb.*; Vol. I., 405.

FUMARIA, *Linn.*; *Gen. Pl.*, *I.*, *56*, *965*.

A genus which belongs to the Natural Order FUMARIACEÆ, having about eight species; usually weeds of cultivation in the temperate regions of the Old World. Only one of these is indigenous to India, namely, **F. parviflora**, but **F. officinalis**, *Linn.*, may be also briefly considered, as it yields the true Fumitory and is employed in Native medicine.

721

Fumaria officinalis, *Linn.*; FUMARIACEÆ.

Vern.—*Pit-pápará*, HIND.; *Shátrá*, DEK.; *Turu*, TAM.; *Chata-rashi*, TEL.; *Baglatul mulk, shateraj*, ARAB.; *Sháhtara*, PERS.

References.—*Pharmacographia Indica, I., 114; Ainslie, Mat. Ind., I., 138; O'Shaughnessy, Beng. Dispens., 184; Moodeen Sheriff, Supp. Pharm. Ind., 273; Dymock, Mat. Med. W. Ind., 52.*

Habitat.—A weed of cultivation in Persia. Two varieties of Fumitory are described in the *Makhzan-el-Adwiya*, one with violet coloured flowers, and the other and larger kind with white flowers.

F. officinalis was mentioned by **Dr. Stewart** in 1859 as occurring as a field weed near Abbottabad, but it is probable that the plant he collected was really **F. parviflora**, since **F. officinalis** has not been found by other botanists in India.

MEDICINE. Fumitory. 722

Medicine.—The entire plant except the root is used medicinally, constituting FUMITORY which has long been known, and was highly esteemed by the Greeks and Romans. It is, however, not now employed by European practitioners, and is not to be found in the Pharmacopœia of England, America, or India, although still much used in this country by native practitioners. The fumitory sold in Bombay is this species (*Dymock*), and is imported from Persia, while in Upper India the indigenous plant is substituted.

The vernacular terms are used indiscriminately, and as the medicinal properties are similar, the uses of both species may be detailed in the account of the Indian plant.

723

F. parviflora, *Lamk.*; *Fl. Br. Ind.*, *I.*, *128*.

Vern.—*Pitpapara* (*Pitpápra*), HIND.; *Ban-sulpha*, BENG.; *Sháhtara, pit-papra, pápra*, PUSHTU; *Shatra*, SIND; *Pitpápra*, BOMB.; *Pitpapda*, GUZ.; *Pitpapara, shátrá*, DEC.; *Turá*, TAM.; *Cháta-ráshi*, TEL.; *Buksat-ul-mulk, baglatul-mulk*, ARAB.; *Shatra, sháhtarah*, PERS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 531; Stewart, Pb. Pl., 11; Pharmacographia Indica, I., 115; O'Shaughnessy, Beng. Dispens., 184; Moodeen Sheriff, Supp. Pharm. Ind., 273; Dymock, Mat. Med. W. Ind., 52; S. Arjun, Bomb. Drugs, 9; Murray, Pl. and Drugs, Sind, 77; Irvine, Mat. Med. Patna, 90; Moodeen Sheriff, Mat. Med. Madras, 22; Atkinson, Him. Dist., 737; Birdwood, Bomb. Pr., 7; Aitchison, Afgh. Del. Com. Rep., 128; Balfour, Cyclop., I., 1155; Bomb. Gaz., VI., 14; Raj. Gaz., 30.*

Habitat.—Found in rice-fields during the cold season; in the Indo-gangetic plain, Lower Himálaya (up to 8,000 feet), and Nilghiri hills. It is described by **Dr. Aitchison** as generally distributed over the whole of Afghánistán.

MEDICINE. 724

Medicine.—Fumitory has long been regarded as laxative, diuretic, alterative, tonic, diaphoretic, and febrifuge. It has consequently been

much used by native practitioners in India, and is still highly esteemed by the Muhammadans. It is, however, very little used by European practitioners, and its value has probably been overestimated by the natives.

FUNGI AND FUNGOID PESTS.

725

The FUNGI of India are very numerous, and comprise many species of economic interest Several are used as food, others as medicine, while certain microscopic forms are of importance, since they produce the rusts, moulds, smuts, and other pests which infest many of our crops, fruits, and timber trees The writer is much indebted to Dr. Barclay for having kindly revised the following brief article.

References —*Stewart, Pb Pl, 267, Barclay's Descr ptive List of the*

MEDICINE. 726

able anthelmintic

which occurs in the nests of white-ants, is also supposed to possess medicinal virtues (*Balfour*).

FOOD. 727

other forms widely used as food by certain classes of natives in India,

FOOD.

another species as being freely eaten in the Panjáb, which is known as *shirlon* in the Jhelam, and *bat-bakri* in the Kair valley. He describes it as "a thin, flat, ragged-looking Fungus, yellow above and with white gills below, which is got on dead trees in various parts of the Panjáb Himálaya at 8,000 to 8,500 feet. The natives slice and cook it either fresh or dry, and eat it as a relish with bread. I have tried this species in stews, &c., but found it leathery and flavourless."

The same author also mentions an "underground mushroom" of doubtful species, found in cultivated ground near Multan and known as *boinphal* in the vernacular. This, he says, is also eaten by the natives.

Balfour in his "*Agricultural Pests of India,*" p. 61, describes an underground fungus, **Mylitta**, as occurring in the Nilgiri hills, and considers it probably closely allied to the so-called native-bread of Tasmania; but gives no record of its being eaten by the natives.

FERMENTS. 728

Ferments.—Some of the microscopic forms seem to be useful as substitutes for yeast (see **Cerevisiæ Fermentum**, Vol. II., 257).

FUNGOID PESTS. 729

Fungoid Pests, the characters of which can generally be made out by the use of the microscope only, are small fungi, which attack and injure the plants or animals on which they are parasitic. Among the more hurtful in India are species of Æcidium, Capundium, Chætomium, Clarterisporum, Diplodia, Dothidea, Eurotium, Glenospora, Hemileia, Hendersonia, Hydnum, Isaria, Leutinus, Pellicularia, Pestalozzia, Puccinia, Russula, Septoria, Uromyces, and Ustilago (*Balfour's Agricultural Pests of India*). Chionyphe Carteri, *Berkeley* (Mycetoma sp. of *H. Vandyke Carter*) is the fungus whose ravages cause the deeply-seated disease known as the MADURA FOOT.

730

Polyporus anthelminticus, *Berkeley*, grows at the root of old bamboos, and is employed as an anthelmintic in Burma.

Ergot. 731

Ergot—Is the sclerotoid condition of **Claviceps purpurea** (see Vol. II., 359).

Mildew. 732 Mould. 733 Rust. 734 Smut. 735

Fungi attacking plants produce an appearance on the leaves, stems, &c., known as MILDEW, MOULD, RUST *or* SMUT. These small parasites present many features of great interest both to the botanist and agriculturist; but owing to the difficulty of determining their life-histories, little is as yet known regarding them. The following forms, however, are those which are at present recorded as attacking the more important crops and trees of India:—

Peridermium Thomsoni, *Berkeley*, is a fungus found on the Picea Morinda of the Himálaya. The leaves under the growth of the parasite become reduced one half in length, curved, and sprinkled, sometimes in double rows, with Æcidia. The growth in time proves fatal to its host. Dr. Barclay has recently described three species of URIDINEÆ which attack the same tree in the North-Western Himálaya—two species of Æcidium and one of **Chrysomyxa**. One of the Æcidia causes general pseudo-hypertrophic distortion of the needles of its host, while the other attacks only the youngest shoots. The first of these may be the same as that described above, but the data given in the description of Peridermium Thomsoni are not sufficient to allow of a decision being arrived at. Dr. Barclay, while regretting that he has not had the time nor opportunity to fully work out the life-history of his first species, writes, "A continued study of it is much to be desired, if only from an economic point of view, for the affection must prove very destructive to these valuable timber trees. Apart from the diversion of nutriment it must occasion, the habit it has of attacking new shoots, and so completely involving them as to destroy them must be most injurious to these trees." A similar æcidial parasite has also been found on **Cedrus Libani**, *var.* **Deodara**, by the same investigator. **Pinus longifolia** and **P. excelsa**, particularly the former,

are largely attacked in certain parts of the Himalaya by an æcidial parasite found on the needles only

FUNGOID PESTS.

736 Acacia eburnea, *Willd*, is attacked largely in the Poona district by a

737

738 Puccinia graminis, *Pers*, is assumed to be the form of "CORN MILDEW" which occurs commonly ... three species of Barberry occur, or parasite has been found by Dr Bar... believed to be the cause of rust and

Wheat rust 739 740

741

Barclay) occurs on Picea Morinda

742 Ravenelia —Two species of this fungus, R sessilis, *Berk*, and R

743

744

destructive to the coffee plantations of Ceylon and Southern India

745 Peronospora —The POTATO crops of Assam have been largely attacked by P. infestans Dr D D Cunningham has noted the occurrence of P. arborescens as a destructive parasite on the POPPY It is quite possible that the cause of the destruction of the VINE industry of Basahr was due to P viticola, but unfortunately there is no sufficient evidence to show what was really the cause of that vine disease It may very possibly have been due to Oidium (Erysiphe) Tuckeri

746 Dr D D Cunningham reports the existence of a root blight in the Darjeeling district TEA gardens The blight was undoubtedly due to a fungus, but the specimens at his disposal did not enable him to determine its nature

Bunt. 747 Tilletia caries, or BUNT is a fungus which attacks WHEAT and occupies the whole farinaceous portion of the grain SORGHUM and the SMALL MILLETS are liable to attacks from allied parasites

Smut. 748 Ustilago or SMUT has been described by Dr Cooke as attacking BARLEY and many GRASSES in the Panjab, also the male flowers of the

FUNGOID PESTS.

MAIZE. In 1870, a form of Ustilago made its appearance on RICE, and is said to have affected a considerable portion of the crop in the neighbourhood of Diamond Harbour in Bengal. The mycelium of this fungus grows into the tissues of its host, forming a whitish, gummy, interlaced thread-like net, in which the spores form. These become at length a more or less coherent mass, dirty-green on the exterior of the infected grain, but of a bright orange-red colour inside. Dr. Barclay, in a note kindly furnished on this subject, writes, "The SMUT on wheat, barley, and oats in Europe is **Ustilago segetum**, *Bull.*; and Dr. Brefeld informs me that the Indian species is identical with it. That on Maize is **U. Maydis**, *DC.*"

In concluding these brief notices of Fungoid Pests the hope may be expressed that the present active researches of Dr. Barclay in the Simla District, and of others, into the interesting life-history of these fungi, may clear up many points which are at present very obscure, and so perhaps open a way to fresh exertions in devising methods for the prevention of the destruction effected by these pests.

For further information regarding Fungoid Pests see Coffee, Indigo, Rice, Wheat, &c.

749

FURCRŒA, *Vent.; Gen. Pl., III., 739.*

An American genus of Amaryllidaceous plants containing some 10 or 15 species. These are closely allied to the Agaves and indeed are commercially viewed as identical, the fibres derived from the two genera being collectively designated American Aloe fibres. **Furcrœa gigantea**, the best known fibre-yielding species of this genus, was formerly known as **Agave fœtida**, and by some writers **Agave vivipara** is spoken of as **Furcrœa Cantala**.

There is very little that need be said here regarding these plants. A few of them are cultivated in India, and these have been experimentally tested for their fibres. In this country, however, their cultivation as sources of fibre has up to this time been very unimportant and insignificant, compared with the degree to which they are utilized in Mauritius. The fibre of **F. gigantea** is, in fact, commercially designated *Mauritius Hemp*. The reader is referred to the article **Agave** in Vol. I., pp. 133—144.

Furniture. See Cabinet Work, Vol. II., 1.

750

FURS.

The following list of the principal fur-bearing animals of India, compiled principally from Forbes Watson's report on a proposed Industrial Survey of India, may be given, leaving the reader, for further information regarding trade, description, and qualities of fur, &c., to refer to the articles on the animals grouped under their popular or commercial names, (Deer, &c.) and to that on "SKINS." The writer is indebted to Major Ward for having kindly revised and supplemented this enumeration.

751 **Ailurus fulgens**, *F. Cuv.* The Red Cat Bear.
Vern.—*Wah*, TIBET.

752 **Arctictis binturong**, *Raffles.* The Black Bear-Cat.
Vern.—*Myouk, kya*, BURM.

753 **Arctomys bobac**, *Schuler.* The Marmot.
Vern.—*Kandia-piu*, TIBET.

754 **A. hemachalanus**, *Hodgson.* The Red Marmot.
Vern.—*Drín*, KASH.

755 **Canis aureus**, *Linn.* The Jackal.
Vern.—*Gidar, kola*, HIND.

756 **C. lupus**, *Elliot.* The Tibet Wolf; or Black Wolf.
Vern.—*Chanco, hakpo.chanko*, TIBET.

Fur-bearing Animals (J Murray)	FURS.
Canis pallipes, *Sykes* The Indian Wolf Vern —*Bhera, laudgah*, HIND	757
Capra hircus, *Linn* The Domestic Goat Vern —*Jumnopari, bakra* HIND	758
Cuon rutilans, *Temm* The Wild Dog Vern —*Jangli kuta, sona kuta, ram kuta, ban kuta*, HIND.; *Kosla*, MAR *Resa kutta*, TEL	759
Felis bengalensis, *Blyth* The Leopard Cat Vern —*Chita-billi*, HIND	760
F chaus *Guld.* The Common Jungle Cat Vern —*Jangli-billi*, HIND	761
F caracal, *Schrebor* The Caracal Vern —*Siagosh*, HIND	762
F jubata, *Schrebor* The Cheetah or Hunting Leopard Vern —*Chita* HIND	763
F leo, *Linn* The Lion Vern —*Singha, sher, babbar sher*, HIND	764
F lynx The Lynx (includes F. isabellina, The Tibet Lynx) Vern —*Es*, TIBET	765
F nebulosa, *Griffith, vel* diardi, *Hodgson* The Clouded Leopard. Vern —*Zik*, BHOT	766
F pardus, *Linn* The Pard Vern —*Tendua, chita*, HIND	767
F tigris, *Linn* The Tiger Vern —*Bagh, sher, sela vagh, nahar*, HIND	768
F torquata, *F Cuv* The Spotted or Desert Cat	769
F uncia, *Schreber* The Ounce or Snow Leopard Vern —*I ker*, TIBET; *Burrel hay*, SIMLA	770
F viverrina, *Bennet* The Tiger Cat or Fishing Cat Vern —*Mach bagrul*, HIND	771
Galeopithecus volans, *Linn* The Flying Lemur. Vern —*Kabong*, MERGUI	772
Halicore dugong, *Erxl* The Dugong. Vern —*Talla-maha*, CEYLON	773
Herpestes pallidus The Common Mungoose. Vern —*Mangús, newul, newra, nyul*, HIND	774
H jerdoni, *vel* monticolus The Long-tailed Mungoose Vern —*Konda yeutawa*, TEL	775
Lagomys roylii, *Ogilby* The Himalayan Mouse Hare. Vern —*Abra* NEPAL	776
Lepus nigricollis, *Cuv* The Black-naped Hare. Vern —*Khargosh*, HIND	777
L pallipes, *Hodgson* The Tibet Hare Vern —*Rek, rigong*, TIBET	778
L ruficaudatus, *Geoffr* The Indian Hare. Vern —*Khargosh*, HIND	779
Loris gracilis, *Shaw* The Slender Lemur, Sloth Vern —*Dewantsi-pilli*, TEL	780

FURS.

Fur-bearing Animals.

781 Lutra leptonyx, *Horsf.* The Clawless Otter.
Vern.—*Chusam*, BHOT.

782 L. nair, *F. Cuv.* The Common Indian Otter.
Vern.—*Pani-kúta*, HIND.

783 Macacus silenus, *Anderson.* The Black Lion-tailed Monkey.

784 Martes flavigula, *Bodd.* The Indian Marten.
Vern.—*Tuturala*, N.-W. HIM.; *Mal-sampra*, NEPAL.

785 M. toufaeus, *Hodgson.* The Tibet or Beech Marten.
Vern.—No name.

Major Ward writes: M. toufaeus, *Hodgson*, is found in Ladak, Baltistán, Tibet, &c. I have seen skins brought to Simla, and have killed it in many places in Baltistan. It is a highly-priced fur. I think M. erminea has been confused with M. toufaeus in its winter coat.

786 M. kathiah, *Hodgson.* The Yellow-bellied Weasel.
Vern.—*Kathia-nyal*, NEPAL.

787 M. strigidorsa, *Hodgson.* The Striped Weasel.
Vern.—No name.

788 M. subhemachalana *Hodgson.* The Himálayan Weasel.
Vern.—*Krau or grau*, KASH.

789 Nycticebus tardigradus, *Geoffr.* The Slow-paced Lemur; Sloth.
Vern.—*Sharmindi billi*, HIND.

790 Ovis aries, *Linn.* The Domestic Sheep.
Vern.—*Hunich, kago, silingia, peluk*, NEPAL.

791 Paradoxurus bondar, *Gray.* The Tree Cat.
Vern. - *Chinghar*, HIND; *Bondar, baum*, BENG.

792 P. musanga, *Raffles.* The Common Tree Cat.
Vern.—*Mennic, lakati*, HIND.

793 Pœphagus grunniens, *Linn.* The Yak.
Vern.—*Yak, ban-chur*, HIND.

794 Pteromys alboniger. The Black and White Flying Squirrel.
Vern.—*Piam piyu*, BHOT.

795 P. caniceps. The Grey-headed Flying Squirrel.
Vern.—*Biyom-chimbo*, LEPCHA.

796 P. inornatus, *Geoffr.* The White-bellied Flying Squirrel.
Vern.—*Rusi-gugar*, KASH.

797 P. magnificus, *Hodgson.* The Red-bellied Flying Squirrel.
Vern.—*Puraj-blakut*, NEPAL.

798 P. petaurista, *Pallas.* The Brown Flying Squirrel.
Vern.—*Pakya*, MAHR.

799 P. spadiceus. The Red Flying Squirrel.
Vern.—*Kywet-shov-byan*, ARAKAN.

800 Rhizomys badius, *Hodgson.* The Bamboo Rat.
Vern.—*Yewcron*, NEPAL.

801 Scuirus giganteus. The Black Hill Squirrel.
Vern.—*Sheu*, TENASSERIM.

802 S. indicus. The Bombay Squirrel.
Vern.—*Shekra*, MAHR.

Fur-bearing Animals. (*J. Murray.*) | FUSTIC.

Scuirus lokriah, *Hodgson*. The Red-bellied Grey Squirrel. 803
Vern.—*Lokriah*, NEPAL.

S. maclellandi, *Horsf*. The Himálayan Squirrel. 804
Vern.—*Kalli-gangdin*, LEPCHA.

S. macrourus, *Forster*. The Grizzled Hill Squirrel. 805
Vern.—*Rookerah*, CINGH.

S. maximus, *Schreber*. The Red Squirrel. 806
Vern.—*Karrat*, HIND.

S. palmarum, *Gmelin*. The Common Indian Ground Squirrel. 807
Vern.—*Gilheri*, HIND

Semnopithecus johni, *Anderson*, The Nilghiri Langúr. 808
Vern.—*Turuni, kodan, pershk*, TODA; *Korangu*, BUDUGA & KURUMBA; *Karing-korangu*, MALAY.

S. schistaceus, *Hodgson*. The Himálayan Langúr. 809
Vern.—*Langúr*, HIND.

Talpa micrura, *Hodgson*. The Mole. 810
Vern.—*Biyu-kantyem*, BHOT.

Vulpes bengalensis. The Indian Fox. 811
Vern.—*Lumri, lokri*, HIND.

V. ferrilatus, *Hodgson*. The Tibetan Grey Fox. 812
Vern.—*Iger*, TIBET.

V. flavesceus, *Gray*. The Persian Fox. 813
Vern.—*Wamer*, NEPAL.

V. fuliginosus, *Hodgson*. Tibet Fox. 814
Vern.—*Theske*

V. griffithii. The Afghanistan Fox. 815

V. leucopus, *Blyth*. The Desert Fox. 816

V. montanus, *Pearson*. The Hill Fox. 817
Vern.—*Wamoo*, NEPAL.

V. pusillus, *Blyth*. The Panjáb Fox. 818

Ursus isabellinus, *Horsf*. The Brown Bear. 819
Vern.—*Barf-ka-rich, bhalu*, HIND.

U. labiatus, *Blainv*. The Black Bear, or Sloth Bear. 820
Vern *Bhalu, rich*, HIND.

U. malayanus, *Raffles*. The Malayan Sun Bear. 821
Vern.—*Bruang*, MALAYAN.

U. torquatus, *vel* tibetanus. The Himálayan Black Bear. 822
Vern.—*Bhalu*, HIND.

Urva cancrivora, *Hodgson*. The Crab-eating Mungoose. 823
Vern.—*Urva*, NEPAL.

Fustic, see Maclura tinctoria and Rhus Cotinus.

FURS.

Fur-bearing Animals.

781 Lutra leptonyx, *Horsf.* The Clawless Otter.
Vern.—*Chusam*, BHOT.

782 L. nair, *F. Cuv.* The Common Indian Otter.
Vern.—*Pani-kúta*, HIND.

783 Macacus silenus, *Anderson.* The Black Lion-tailed Monkey.

784 Martes flavigula, *Bodd.* The Indian Marten.
Vern.—*Tuturala*, N.-W. HIM.; *Mal-sampra*, NEPAL.

785 M. toufaeus, *Hodgson.* The Tibet or Beech Marten.
Vern.—No name.

Major Ward writes: M. toufaeus, *Hodgson*, is found in Ladak, Baltistán, Tibet, &c. I have seen skins brought to Simla, and have killed it in many places in Baltistan. It is a highly-priced fur. I think M. erminea has been confused with M. toufaeus in its winter coat.

786 M. kathiah, *Hodgson.* The Yellow-bellied Weasel.
Vern.—*Kathia-nyal*, NEPAL.

787 M. strigidorsa, *Hodgson.* The Striped Weasel.
Vern.—No name.

788 M. subhemachalana *Hodgson.* The Himálayan Weasel.
Vern.—*Krau or grau*, KASH.

789 Nycticebus tardigradus, *Geoffr.* The Slow-paced Lemur; Sloth.
Vern.—*Sharmindi billi*, HIND.

790 Ovis aries, *Linn.* The Domestic Sheep.
Vern.—*Hunick, kago, silingia, peluk*, NEPAL.

791 Paradoxurus bondar, *Gray.* The Tree Cat.
Vern. - *Chinghar*, HIND; *Bondar, baum*, BENG.

792 P. musanga, *Raffles.* The Common Tree Cat.
Vern.—*Mennie, lakati*, HIND.

793 Pœphagus grunniens, *Linn.* The Yak.
Vern.—*Yak, ban-chur*, HIND.

794 Pteromys alboniger. The Black and White Flying Squirrel.
Vern.—*Piam piyu*, BHOT.

795 P. caniceps. The Grey-headed Flying Squirrel.
Vern.—*Biyom-chimbo*, LEPCHA.

796 P. inornatus, *Geoffr.* The White-bellied Flying Squirrel.
Vern.—*Rusi-gugar*, KASH.

797 P. magnificus, *Hodgson.* The Red-bellied Flying Squirrel.
Vern.—*Puraj-blakut*, NEPAL.

798 P. petaurista, *Pallas.* The Brown Flying Squirrel.
Vern.—*Pakya*, MAHR.

799 P. spadiceus. The Red Flying Squirrel.
Vern.—*Kywet-shov-byan*, ARAKAN.

800 Rhizomys badius, *Hodgson.* The Bamboo Rat.
Vern.—*Yeweron*, NEPAL.

801 Scuirus giganteus. The Black Hill Squirrel.
Vern.—*Sheu*, TENASSERIM.

802 S. indicus. The Bombay Squirrel.
Vern.—*Shekra*, MAHR.

Fur-bearing Animals (J. Murray) | FUSTIC

Sciurus lokriah, *Hodgson* The Red-bellied Grey Squirrel Vern —*Lokriah*, NEPAL	803
S maclellandi, *Horsf* The Himálayan Squirrel Vern —*Kalli gangdin*, LEPCHA	804
S macrourus, *Forster* The Grizzled Hill Squirrel Vern —*Rookerah* CINGH	805
S maximus, *Schreber* The Red Squirrel. Vern —*Karrat*, HIND	806
S palmarum, *Gmelin* The Common Indian Ground Squirrel Vern —*Gilheri* HIND	807
Semnopithecus johni, *Anderson* The Nilghiri Langur Vern —*Turuni, kodan pershk*, TODA , *Korangu*, BUDUGA & KURUMBA *Karing korangu* MALAY	808
S schistaceus, *Hodgson* The Himalayan Langur Vern —*Langur* HIND	809
Talpa micrura, *Hodgson* The Mole Vern —*Biyu kantyem*, BHOT	810
Vulpes bengalensis The Indian Fox Vern —*Lumri lokri*, HIND	811
V ferrilatus, *Hodgson* The Tibetan Grey Fox Vern —*Iger*, TIBET	812
V flavesceus, *Gray* The Persian Fox Vern —*Wamer*, NEPAL	813
V fuliginosus, *Hodgson* Tibet Fox Vern —*Theske*	814
V griffithii The Afghanistan Fox	815
V leucopus, *Blyth* The Desert Fox.	816
V montanus, *Pearson* The Hill Fox Vern —*Wamoo* NEPAL	817
V pusillus *Blyth* The Panjáb Fox	818
Ursus isabellinus, *Horsf* The Brown Bear Vern —*Barf ka-rich bhalu*, HIND	819
U labiatus *Blainv* The Black Bear, or Sloth Bear Vern *Bhalu rich* HIND	820
U malayanus, *Raffles* The Malayan Sun Bear Vern —*Bruang*, MALAYAN	821
U torquatus, *vel* tibetanus The Himálayan Black Bear Vern.—*Bhalu*, HIND	822
Urva cancrivora, *Hodgson* The Crab-eating Mungoose Vern —*Urva* NEPAL	823

Fustic, see Maclura tinctoria and Rhus Cotinus

GADUS.

1

Gadus morrhua, *Linn.;* PISCES.

THE COMMON COD.

The fish from which the officinal Cod Liver oil is obtained, is not a native of the Indian seas; it abounds on the coasts of Norway, France, Britain, Ireland, and is specially common in the seas along the coast of Newfoundland. The oil extracted from the liver is imported into this country for medicinal purposes. It is a valuable alterative and nutritive tonic, especially beneficial in scrofulous and tuberculous affections, rickets, and other diseases due to impaired nutrition.

SUBSTITUTES. 2

Substitutes.—Several Indian fish yield oil, which is, however, owing to carelessness in methods of manufacture, generally rancid and unfit for medicinal use. Dr. Bidie states that the best of these oils, and one that might be substituted for the officinal OLEUM MORRHUÆ, is that obtained from the livers of certain species of **Carcharias**, which abound off the Western Coast. See **Carcharias,** Vol. II., 155; also **Fish,** Vol. II., 368-397.

Galangal; see **Alpinia Galanga,** *Willd.;* Vol. I., p. 192.

3

Galbanum. A gum-resin, probably obtained from two species of **Ferula,** *viz.,* **F. galbaniflua** and **F. rubicaulis.** See Vol. III., 338.

Galena or Sulphide of Lead, see **Lead,** Vol. IV.

GALIUM, *Linn.; Gen. Pl., II., 149.*

A genus of small, weak herbs of the Natural Order RUBIACEÆ, comprising about 150 species, mostly temperate. Of these 20 are natives of India, and occur chiefly on the Temperate Himálaya.

4

Galium verum, *Linn.; Fl. Br. Ind., III., 208;* RUBIACEÆ.

THE CHEESE RENNET.

References.—*Boiss., Fl. Orient., III., 62; Balfour, Cyclop., I., 1163; Smith, Dic., 107; Treasury of Bot., I., 517.*

Habitat.—A perennial herb with erect or rambling stems from 1 to 3 feet high, found in the Western Himálaya at altitudes of 5,000 to 10,000 feet.

DYE. Roots. 5

Dye.—Smith mentions that the ROOTS are extensively collected in Europe for the dye which they yield, which is said by him to be equal to madder. Several other species of the genus yield a purple dye, but no mention appears to be made by Indian writers of their utilisation in this country.

DOMESTIC. Plant. 6

Domestic Uses.—The PLANT was formerly extensively employed in Europe as a reagent for curdling milk, from which property it has derived its popular name, but in India the best known vegetable rennet is **Withania coagulans.**

7

Galium, sp.

An undetermined species of GALIUM, mentioned by Aitchison as very common in the shade of rocks on the low hills near Badghis, in Afghánistan, which was observed by him to dye the hands a yellow-green on collecting it. (*Botany of Afgh. Del. Com., 73.*)

GALLS.

8

Galls.

By the term gall is commonly understood a deformity or excrescence, due to a parenchymatous hypertrophy of the structure of a plant caused

work.

9

LIST OF THE CHIEF GALL-BEARING PLANTS OF INDIA

Acacia leucophlœa, *Willd*
Areca Catechu, *Linn*
Cinnamomum zeylanicum, *Breyn.*
Fraxinus floribunda, *Wall*
Garuga pinnata, *Roxb*
Litsœa polyantha, *Juss*
Pistacia integerrima, *Stewart*
P. mutica, *var* cabulica, *Stocks*
Pongamia glabra, *Vent.*
Prosopis spicigera, *Linn*
P Stephaniana, *Kunth*
Quercus Ilex, *Linn.*
Salvadora oleoides, *Dcne*
Tamarix articulata, *Vahl*
T dioica, *Roxb*
T. gallica, *Linn*
Terminalia Chebula, *Retz*
T. tomentosa, *Bedd*

GAMBIER.

10

Gambier.

This resinous extract is prepared from Uncaria Gambier, *Roxb*, much in the same manner in which Cutch or Catechu is made The plant is a native of Malacca, Penang, and Singapore, distributed to Java and Sumatra. The extract made up in small (one inch) cubes, is of a pale

greyish yellow colour, and has a bitter taste. It is largely imported into India to be eaten in *pán*, but the yellow semi-crystalline form of Cutch prepared in Kumáon is to a large extent used for the same purpose, and is even made up in cubes to resemble Gambier. Gambier is an officinal drug in the British Pharmacopœia, and is known in medicine as pale catechu. In the United States Dispensatory Catechu (Acacia Catechu) is officinal, while Gambier is rejected. In the Indian Pharmacopœia both drugs are officinal.

A certain re-export trade in Gambier takes place from India, but the official designation (in Trade Returns) of "Cutch and Gambier" should be understood to refer almost exclusively to the dark or Pegu form of Cutch, and to the pale or Kumáon form of so-called Gambier. See Acacia Catechu, Vol. I., pp. 29 to 40; also Uncaria.

Gamboge, see the various species of Garcinia.

Game Birds, see Ducks, &c., also Peacock, Pheasant, Pigeon, and Snipe.

Gao-zaban, see Echium, sp., p. 200; also Onosma bracteatum, *Wall.*, BORAGINEÆ.

GARCINIA, *Linn.*; *Gen. Pl.*, *I.*, *174.*

A genus of trees, usually yielding yellow juice, which belongs to the Natural Order GUTTIFERÆ, and comprises in all some 50 species, which are distributed over Tropical Asia, Africa, and Polynesia. Of these, about 30 are natives of India, and several possess features of considerable economic interest.

11

Garcinia anomala, *Planch. & Trian*; *Fl. Br. Ind.*, *I.*, *266*; GUTTIFERÆ.

Syn.—GARCINIA AFFINIS, *Wall.* (*in part*).

References.—*Kurz, For. Fl. Burm.*, *I.*, *89*; *Kurz, Prelim. For. Rep. on Pegu, App. A.*, *xii.*; *Indian Forester, IV.*, *241*; *XI.*, *392.*

Habitat.—A small erect tree found in the beds of torrents, in the Jaintia Hills and Khásia Mountains, between altitudes of 3,000 and 5,000 feet; also not uncommon in the damp and dry hill forests of Martaban east of Tounghoo at elevations of from 4,000 to 6,000 feet.

GUM. 12

Gum-Resin.—The tree yields "an inferior gamboge" (*Kurz*).

TIMBER. 13

Structure of the Wood.—Sapwood white, soft (*Kurz*).

14

G. Cambogia, *Desrouss*; *Fl. Br. Ind.*, *I.*, *261.*

Syn.—GARCINIA ZEYLANICA, *Roxb.*; G. AFFINIS, *Wight & Arn.* (*not of Wall.*); G. ELLIPTICA, *Wall.*

Var. 1.—CONICARPA, *Wight. Ic.*, *121* (excl. δ).

Var. 2.—PAPILLA, *Wight. Ic.*, *t. 960, 961* (sp.).

Vern.—*Vilaiti-amli*, BOMB.; *Hila*, BURGHERS (NILGHIRIS); *Aradal, manthulli*, KAN.; *Goraka*, SING.

References.—*Wight & Arn., Prod.*, *I.*, *561*; *Roxb., Fl. Ind., Ed. C.B.C.*, *442*; *Corom. Pl.*, *III.*, *t. 298*; *Beddome, Fl. Sylv.*, *t. 85*; *Gamble, Man. Timb.*, *24*; *Thwaites, En. Ceylon Pl.*, *48*; *U. S. Dispens.*, *15th Ed.*, *1183*; *Mason, Burma and its People*, *480, 515*; *Drury, U. Pl.*, *220*; *Lisboa, U. Pl. Bomb.*, *10, 147, 241*; *Cooke, Gums and Gum-resins*, *41*; *P. W. D., Report on Gums*, *2, 7-9, 34*; *Balfour, Cyclop.*, *I.*, *1175*; *Treasury of Bot.*, *I.*, *206*; *Indian Forester, II.*, *20, 58, XI.*, *379, 392*; *Madras Manual of Administration, II.*, *65, 135*; *Gazetteers:—Bombay, XV.*, *427*; *Mysore and Coorg, I.*, *68*; *Special Reports from the Conservators of Forests of Southern Circle, Madras and Bombay.*

Habitat.—A small evergreen tree of the mountains of the Western Peninsula from Concan to Travancore; also met with in Ceylon.

GUM. 15

Gum-Resin.—Thwaites states that this species yields (in Ceylon) a yellow, insoluble, very adhesive gum, which is valueless as a pigment on account of its insolubility in water. It is, however, easily soluble in

spirits of turpentine, and is likely to prove useful as a varnish. A considerable amount of confusion exists in the descriptions of various writers

OIL 16
FOOD Rind. 17
TIMBER. 18

for common furniture (Beddome)

Garcinia cornea, Linn., Fl Br Ind, I, 260, Wight, Ic, t 105 — 19

Syn — GARCINIA AFFINIS, Wall Cat 4852, 4853, and 4854 in part, not of Wight & Arn, DISSOSTIGMA FABRILE, Miquel

References — Roxb, Fl Ind, Ed C B C 444, Kurz For Fl Burm, I 88, Kurz in As Soc Journ Beng, XXXIX, 64 Prelim For Rep on Pegu, App A, xii, Balfour, Cyclop, I, 1175, Ind Forester, XI, 392

Habitat — An evergreen tree, from 40 to 60 feet in height, met with in Eastern Bengal and Burma

GUM. 20 — Gum-Resin — Yields an inferior kind of Gamboge

TIMBER. 21 — Structure of the Wood — Brown, heavy, of a coarse unequal fibre, hard, rather close-grained (Kurz)

G. Cowa, Roxb, Fl Br Ind, I, 262, Wight, Ic, tt 104 & 113 — 22

Syn — GARCINIA KYDIA, Roxb, G ROXBURGHII, Wight G UMBELLIFERA, Roxb G WALLICHII, Chois; G LOBULOSA, Wall, OXYCARPUS GANGETICA, Ham

Vern — Cowa, HIND, Taungthalé, toung-da lai, ma-dow BURM

GUM. 23

DYE. Bark. 24

mordant.

FOOD. Fruit. 25 — Food — Roxburgh describes the FRUIT as edible " though not the most palatable "

TIMBER. 26 — Structure of the Wood — Greyish-white, moderately hard Weight 37 to 47lb per cubic foot (Gamble) White, turning yellow, rather heavy, coarsely fibrous, loose grained, very perishable (Kurz)

The Gamboge Trees.

27

Garcinia echinocarpa, *Thw.; Fl. Br. Ind., I., 264.*

Vern.—*Madol,* SING.

References.—*Beddome, Fl. Sylv., Anal. Gen., xxi.; Thwaites, En. Ceylon Pl., 49; Indian Forester, X., 33.*

Habitat.—A tall tree of the Central and Southern Provinces of Ceylon.

OIL. Seeds. 28

Oil.—" A thick oil, extracted from the SEEDS, is used by the Singhalese for burning in their lamps, but it gives a very indifferent light" (*Thwaites*).

29

G. eugeniæfolia, *Wall.; Fl. Br. Ind., I., 268.*

Habitat.—A small tree of the Eastern Peninsula, found in Singapore, by Wallich, and in Malacca, by Griffith.

GUM. 30

Gum-Resin.—Helfer mentions that the stem exudes a green varnish, and Griffith that the juice of the fruit is milky. No further information, in confirmation of these interesting statements, is, however, available.

31

G. heterandra, *Wall.; Fl. Br. Ind., I., 265.*

Syn.—HEBRADENDRON WALLICHII, *Chois.* Kurz considers this Burmese species to be identical with the Sylhet specimen, G. ELLIPTICA, *Wall.*, and he retains the latter name for both. The *Flora of British India,* however, reduces the Sylhet plant to **G. Morella,** *Desrouss.*, a synonymy that has been here followed. It appears probable, that the information, given by writers on the resources of Burma, regarding the plant they call **G. elliptica,** *Wall.*, really refers to the species at present under consideration, and will, consequently, be detailed in this article.

Vern.—*Thanat-tau, tha-nat-dau,* BURM.

References.—*Kurz, For. Fl. Burm., I., 92; in As. Soc. Jour. Beng., XLIII., pt. II., 87; Prelim. Forest Report on Pegu, App. A., xiii.; Gamble, Man. Timb., 22; Mason, Burma and its People, 480-82, 751; Jour. Agri.-Hort. Soc. Ind., X. (old series), pro. cxxi.; Balfour, Cyclop., I., 1175; Indian Forester, XI., 393.*

Habitat.—An evergreen tree of the forests of Pegu and Tenasserim, ascending to 4,000 feet.

GUM. 32

Gum-Resin.—Mason, and later, Kurz, have both described this tree as yielding a superior kind of Gamboge, so similar to the Gamboge of commerce that the former writer considered it identical. He wrote, " In its appearance to the eye and in its properties as a pigment, I have failed to discover the slightest difference between the exudation of this tree and the Gamboge of commerce." It readily forms an emulsion with water.

An interesting account is given, in the Agri-Horticultural Society's Journals, Vol. X. (old series), of an analysis of a gamboge obtained from a tree in Burma, called *Tanatan* (probably a misprint for *Tanatau,* the vernacular name of this species). Mr. D. Hanbury, the analyst, writes, "I find this gum-resin to be, in its chemical characters, precisely like the ordinary Siamese gamboge; it is, however, much mixed with impurities, and is, in fact, but rudely prepared. If carefully collected and cast in bamboos (like the Siam drug), I cannot but think that it would equal the finest gamboge we get."

DYE. 33

Dye.—Mason states that the Burmese priests occasionally employ the gamboge obtained from this species to dye their robes, and the Karens to colour their thread; and that it serves equally well as a pigment.

MEDICINE. Gum-resin. 34

Medicine.—The GUM-RESIN is occasionally, though not extensively, employed as a medicine by Burman native practitioners (*Mason*).

TIMBER. 35

Structure of the Wood.—White, soft.

36

G. indica, *Chois.; Fl. Br. Ind., I., 261; Wight, Ill., I., 125.*

COCUM OR KOKAM BUTTER, MANGOSTEEN OIL, BRINDONIA TALLOW, *Eng.;* BEURRE DE COCUM, HUILE DE MADOOL, *Fr.;* BRINDÁO, *Port.*

GARCINIA indica.

Kokam Butter. (*J. Murray.*)

Syn.—G. PURPUREA, *Roxb.*; G. CELEBICA, *Desrouss.*, BRINDONIA INDICA, *Dupetit-Th.*

Vern.—

References.—

about April.

DYE. Fruit. 37

OIL. Seeds. 38

fruit to the extent of about 30 per cent. The process of preparation is

water and boiled. After some time it is poured out into another vessel

cess.—In this process the kernels are pressed in an ordinary oil mill, like other oil-seeds, and the oil is extracted."

DESCRIPTION

in the bazárs of
a dirty white or
like spermaceti.

GARCINIA indica.

Kokam Butter.

CHEMISTRY.

bland oily taste. It melts in the mouth like butter, and leaves a sensation of cold on the tongue. When long kept it is apt to become rancid, and acquires a browner colour, while an efflorescence of shining tufted crystals appears on the surface of the mass. As ordinarily met with, it contains a considerable amount of impurity, chiefly particles of the seed. As above stated, the purest quality is that obtained by the second process (churning). By filtration under the influence of heat it may be obtained perfectly pure, in which condition it is quite transparent, and of a very light yellowish colour, but at lower temperatures it becomes white and crystalline. The butter of commerce melts at about 40°C. Flückiger and Hanbury give the following account of its chemical composition: "Purified kokám butter boiled with caustic soda yields a fine hard soap, which, when decomposed with sulphuric acid, affords a crystalline cake of fatty acids weighing as much as the original fat. The acids were again combined with soda, and the soap having been decomposed, they were dissolved in alcohol of about 94 per cent. By slow cooling and evaporation crystals were first formed, which, when perfectly dried, melted at 69·5°C.: they are consequently Stearic acid. A less considerable amount of crystals, which separated subsequently, had a fusing point of 55°, and may be referred to Myristic acid. A portion of the crude fat was heated with oxide of lead and water and the plumbic compound dried and exhausted with ether, which after evaporation left a very small amount of liquid oil, which we refer to oleic acid." It contains no volatile fatty acid.

HISTORY. 40

HISTORY.—Kokam butter has doubtless been employed by the Natives, of at least South-Western India, since remote times, but it does not appear to have attracted the notice of Europeans till about the year 1830. In 1833 a writer in the Journal of the Asiatic Society of Bengal, described its employment medicinally by the Natives and advocated its trial by Europeans. It was adopted as officinal during the compilation of the *Indian Pharmacopœia* in 1868, and is now generally recognised as a solid oil of considerable value.

MEDICINE. Fruit. 41

Medicine.—The FRUIT has been long employed in South-Western India as a semi-medicinal article of diet. The authors of the *Pharmacographia Indica* state that its virtues were first recognised by the English at the end of the eighteenth century, when it was employed as an anti-scorbutic in the Bombay Army. It is acid, slightly astringent, and is considered by native physicians to be superior to tamarind for the preparation of acidulous drinks. Dymock states that the apothecaries of Goa prepare a very fine red syrup from the juice of the fruit, which they administer in "bilious affections." The OIL or Kokam butter, already described, is considered demulcent, nutrient, and emollient. Moodeen Sheriff, in his forthcoming work on the *Materia Medica* of Madras, writes, "I have used it internally in my practice, and have found that its best medicinal properties are its usefulness in phthisis pulmonalis and some scrofulous diseases, and in dysentery and mucous diarrhœa. In the former, its action is something like that of cod-liver oil, of which it is a pretty good, and very cheap and pleasant, substitute; and in the latter, it is of great service in relieving tormina and tenesmus when employed as an adjuvant to other medicines." He recommends doses of from ½ to 1 ounce as a nutritive tonic in place of cod-liver oil, and 1 to 2 drachms as an emollient adjuvant to other drugs in dysentery and mucous diarrhœa. It is employed externally by the natives as a remedy for excoriations, chaps, fissures of the lips, &c., by partly melting it and rubbing the affected part. It was introduced into the Pharmacopœia, however, chiefly with the purpose of bringing it into use for the preparation of ointments, suppositories, and other similar preparations. Dymock considers it an excellent substitute for spermaceti, and recommends its employ-

Oil. 42

Kokam. (J. Murray.) GARCINIA indica.

sures of the skin of the feet so common among natives in the cold weather (*Surgeon-Major H. W. E. Catham, M D, Ahmednagar*). "The fruit is made into a sherbet, and as such is useful in fever as a cooling drink It is also anti-scorbutic" (*Surgeon-Major A. S. G Jayakar, Muskat*). "Half an ounce of kokam butter, melted and mixed with a little boiled rice, is used in dysentery. The dose is repeated once daily" (*Surgeon James McCloghry, Poona*).

FOOD Fruit 45

Food.—The purple FRUIT has an agreeable flavour, and has long been esteemed as an article of diet It is mentioned by Garcia DeOrta (1563)

COMPOSITION. 46

COMPOSITION OF KOKAM.

acid, but 13·53 per cent. of malic acid. The hot water extract formed 42·9 per cent., and the ash 7·88 per cent., of which 5·92 per cent. was soluble in water. The alkalinity of the ash calculated as potash was ·79 per cent.

FOOD. Oil. 47

Young leaves. 48

Seed. 49

The concrete OIL is occasionally employed in native cookery, and is said to be largely used in Goa for the purpose of adulterating *Ghi*, a statement which is, however, contradicted by Dymock. Rumphius mentions that the YOUNG LEAVES were employed in Amboyana in cooking fish. The Collector of South Kanara, in a communication to the Government on the subject, published in 1889, states that "the SEED of the ripe fruit is swallowed raw by the natives as a delicacy."

TRADE. 50

Trade.—The average annual value of a full crop from a well grown tree is said in the Southern Konkan to amount to R7; and in the same locality the *Kokam* sells at 35lb per rupee, and the oil at 6 to 8lb per rupee (*Dir. Land Rec. and Agric., Poona*). Dymock states that the dried fruit obtained in Bombay comes principally from Goa, Hingoli, and Malwan, and is sold for R40 per kandy of 28 Bombay maunds of 28lb each, while the *Kokam* butter, which is principally obtained from Goa, fetches R5 to 7 per Surat maund of 37½lb. A small quantity of the latter is annually exported from Bombay, but the quantity cannot be accurately ascertained, since for statistical purposes it is not registered separately from other sorts of vegetable oils.

INDUSTRIAL USES.

Candles. 51

Industrial and Agricultural Uses.—*Kokam* butter yields stearic acid in larger quantities, more easily, and in a purer state than do most other fats, and therefore appears to be particularly suitable as a substance for candle-making. The learned authors of the *Pharmacographia*, commenting on this fact, write, "But that it is possible to obtain it in quantities sufficiently large for important industrial uses, appears to us very improbable." In connection with this remark it is worthy of notice, that the Director of Land Records and Agriculture, Poona, states that in Ratnagiri alone the number of trees is estimated at 13,000, and that they abound in other parts of the Southern Konkan. It, therefore, appears that the supply need not be so limited as Flückiger and Hanbury supposed, and that the preparation of *Kokam* butter may be an industry capable of considerable and profitable development.

MANURE. Oil-cake. 52

MANURE.—The OIL-CAKE obtained as a by-product in the preparation of the concrete oil is considered excellent manure.

53

Garcinia lanceæfolia, *Roxb.; Fl. Br. Ind., I., 263; Wight, Ic., t. 163.*

Syn.—GARCINIA PURPUREA, *Wall., Cat., 4862, and Chois.* (not of *Roxb.*)

Vern.—*Kirindur*, SYLHET.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 442; Kurz, For. Fl. Burm., I., 91; Gamble, Man. Timb., 22; Balfour, Cyclop., I., 1176; Agri-Hort. Soc. India, Trans., VII., 75; Journal (Old Series), IV., 204.*

Habitat.—A small tree, with dark, rough bark, inhabiting the forests of Assam and Sylhet. It flowers in February, and the fruit ripens in July.

FOOD. Fruit. 54

Food.—Roxburgh states that it is cultivated by the natives of Sylhet for its FRUIT, of which they are fond.

55

G. Mangostana, *Linn.; Fl. Br. Ind., I., 260.*

THE MANGOSTEEN.

Vern.—*Mangústán*, HIND.; *Mangustán*, BENG.; *Mangostin, mangustan*, BOMB.; *Mangastín*, MAR.; *Manggusta*, MALAY.; *Mengkop, mimbu, mengut, mangkob, youngzalai*, BURM.; *Manggis*, MALAYS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 441; Kurz, For. Fl. Burm., I., 87; Gamble, Man. Timb., 22; DC., Origin Cult. Pl., 188; Mason, Burma and its People, 447, 750; Pharm. Ind., 31; O'Shaughnessy, Beng. Dispens., 236; Moodeen Sheriff, Supp. Pharm. Ind., 145; Dymock, Mat. Med. W. Ind., 2nd Ed., 82; Pharmacog. Ind., I., 167; U. S. Dis-*

The Mangosteen. (J. Murray) GARCINIA Mangostana.

1870-71, 33, 42.

Habitat.—An evergreen tree, native of the Straits, cultivated in British Burma on account of its fruit. Of recent years, it has also been successfully cultivated at a few places in the Madras Presidency. The attempts made by Roxburgh, in Bengal, and by several individuals in Bombay, to introduce this fruit tree into these presidencies have been unsuccessful. The former observes, "The plant has uniformly become sickly when removed to the north or west of the Bay of Bengal, and rarely rises ... De Candolle, ... larize ... ccurs, ... in its ... those

CULTIVATION. 56

... ed in Southern Tenasserim, and, as already remarked, has of late years been successfully introduced into Madras. A congenial amount of heat and ... cul- ... with ... Gov- ... ys to ...

GUM-RESIN. 57

DYE. Rind. 58

TAN. 59

MEDICINE. Fruit. 60

Bark. 61

Young leaves. 62

CHEMISTRY. 63

... that the rind contains *tannin, resin*, and a crystallizable principle *man-*

gostine. As the physiological actions of the two latter constituents have not as yet been separately studied, it is impossible to say whether the effect caused by the drug is due simply to the tannin it contains, or whether the *resin* and *mangostine* may not possess peculiar therapeutic properties. The unanimity of opinion as to the efficacy of Mangosteen rind, evidenced in the following special opinions, would seem to indicate that it is a remedy of decided value, and that it probably does possess some property in addition to the simple astringency of tannin.

SPECIAL OPINIONS.—§ "The powder of the dried rind has been administered in intermittent fever with varying success" (*Honorary Surgeon P. Kinsley, Chicacole, Ganjam, Madras*). "The rind contains a good deal of tannic acid. In fine powder it is largely and effectively used in Burma for diarrhœa and dysentery, but I found it very efficacious in diarrhœa only. A wine of mangostin (ʒI to ʒI) is the best method of administration; dose for an adult, ½ dr. to ʒI" (*Devendro Nath Roy, Campbell Medical School, Calcutta*). "The rind is used with benefit in cases of chronic diarrhœa in children" (*Bolly Chund Sen, Campbell Medical School, Calcutta*). "A decoction of the rind is a good astringent in chronic dysentery and diarrhœa" (*Surgeon D. Picachy, Purneah*). "This fruit is brought here in large quantities from the Straits Settlements in July and August. Natives suffering from gonorrhœa and gleet use it largely, as it lessens urethral irritation, and the discharge is in many instances completely arrested. It is, therefore, classed by them as a cooling and refrigerant fruit. A small quantity of the rind, steeped over night in cold water and taken in the early morning as a draught, is a valuable remedy for long standing diarrhœa, both in adults and children" (*Honorary Surgeon A. E. Morris, Tranquebar*).

FOOD. Fruit. 64

Food.—The FRUIT is highly esteemed both by Europeans and Natives, and is indeed considered by many to be the most palatable of fruits. It is about the size of a small apple, with a thick, succulent, astringent rind, of a reddish-brown colour externally, but bright crimson on section. Within this are placed the 4 to 12 large seeds each surrounded with its juicy white aril, sweet and acidulous, with a delicate flavour like the odour of the primrose.

TRADE. 65

Trade.—A large quantity of the fruit, both fresh and dried, is annually imported from the Straits and may be purchased on the streets of Calcutta in small baskets, though it is customary to find the fruits of Achras Sapota passed off on the ignorant as Mangosteens The fruit comes into season in May and June.

66

Garcinia Morella, *Desrouss; Fl. Br. Ind., I., 264; Wight, Ic., tt.* [*102, 120.*

THE GAMBOGE TREE.

Syn.—GARCINIA LOBULOSA, *Wall.*; G. PICTORIA, *Roxb.*; G. ELLIPTICA; *Wall (in part)*; G. ACUMINATA, *Planch. & Trian.*; G. GUTTA, *Wight*; HEBRADENDRON CAMBOGIOIDES, *Graham*. G. CAMBOGIOIDES, *Royle*;

Vern.—The tree=*Tamál*, the drug=*ghótághaubá, gótá ganbá, tamál*, HIND.; the tree=*Tamál*, the drug=*tamál*, BENG.; the drug=*Ausarahe-revan*, DEC., C. P.; the tree=*Tamál*, the drug=*revachinnisirá, tamál*, MAR.; the drug=*Makki, iréval-chinip-pál*, the oil=*makki*, TAM.; the drug=*Révalchini-pál*, TEL.; the tree=*Arsinagurgi mara, aradal, punar puli*; the drug=*Tamál*, KAN.; the tree=*Darámba*, MALAY.; the tree=*Tha-men-gút*, the drug=*sanato-sí, tanato-así*; the oil=*parawa, ballowa*, BURM.; the drug=*Gotakú, gotakú-melliyam, kana goraka*, SING.; the drug=*rubbi-revánd, aushúre révand, farfirán*, ARAB. and PERS. The literal meaning of the above Arabic, Persian, Hindustáni, Dekhani, Telugu, and Mahratti synonyms for the gum-resin *is explained by* Moodeen Sheriff to be the "juice or extract of Rhubarb," but they have become, according to the usages of the languages, the correct names of Gamboge.

The True Gamboge Tree. (J. Murray.)

GARCINIA Morella.

References.—Roxb. Fl. Ind. Ed. C.B.C. ...

HISTORY. 68

...ted to investigate
... "The Coorg or

south, and in some
part is made little
we have seen the

been used as a yellow dye
d Dr. Dymock states that

GARCINIA Morella.

The True Gamboge Tree.

HISTORY.

"the juice of the tree under the Sanskrit name of *Tamála* has long been employed as a pigment for making sectarial marks on the forehead by the Hindús of Kanara and Mysore." Towards the middle of the present century, specimens of Gamboge procured from Indian trees were carefully analysed and critically compared with pure Siam gamboge by chemists both in this country and in England, with the result that the two were declared to be practically identical. Notwithstanding this no attempt appears to have been made to collect the exudation free from impurities, and in such a state that it could compete with success with the pure "pipe gamboge" from Siam.

COLLECTION. 69

COLLECTION.—The gamboge of commerce, which is imported into Europe from Singapore, Bangkok, and Saigon, and is the produce of Siam, Cambodia, and the Southern parts of Cochin-China, is collected in the following way: "At the commencement of the rainy season a spiral incision is made in the bark round half the circumference of a full-sized tree, and the juice, which then slowly exudes for several months, is received into a joint of bamboo, which is placed at the lower end of the incision for that purpose. When the juice has hardened the shell of bamboo is removed, and the gamboge is thus obtained in the form of a roll or cylinder" (constituting the *Roll* or *Pipe Gamboge* of commerce). "According to Spencer St. John, a tree will yield on an average, in a season, sufficient gamboge to fill three joints of bamboo 20 inches in length, by about 1½ inches in diameter. The trees should be incised in alternate years" (*Bentley & Trimen*). "*Cake*" or "*Lump Gamboge*" is obtained either from a similar incision, or by breaking the leaves and twigs, the yellow juice which exudes being collected either on the leaves of the tree or in cocoanut shells. A slightly different account is given by Flückiger and Hanbury quoting Dr. Jamie of Singapore. "The best time for collecting is from February to March or April. The trees, the larger the better, are wounded by a *parang* or chopping knife, in various parts of the trunk and large branches, when prepared bamboos are inserted between the wood and the bark of the trees. The bamboo cylinders being tied or inserted are examined daily till filled, which generally takes from fifteen to thirty days. Then the bamboos are taken to a fire, over which they are gradually rotated till the water in the gum-resin is evaporated, and it gets sufficiently hard to allow of the bamboo being torn off." These methods appear to have been untried in India, answers from forest officers to questions regarding the amount collected and methods of preparation shewing that as a rule minute incisions only are made from which small tears of the gum-resin are obtained. In Ceylon it is usually collected by cutting a thin slice of the size of the palm of the hand off the bark, here and there. On the flat space thus exposed, the gum collects and is scraped off when sufficiently dry. As a consequence only cake gamboge, or the gum-resin in small particles, is obtained, both of which forms are always much less pure than the Siam pipe gamboge. The District Forest Officer of North Malabar reports that, by making small incisions in the bark of a tree 16 inches in diamater, ¼lb of first class pigment was obtained, but the method appears much more laborious, less productive, and more liable to result in the admixture of impurities than that of collecting in bamboos. A consideration of the literature on the subject indicates the advisability of giving the Siam method at least a fair trial.

Another method is reported from Madras, which consists in partially stripping the bark, pounding and boiling it, straining the resulting liquor, and inspissating it over a slow fire. This necessarily laborious and expensive process is said to yield an inferior article though in large quantities. But since gamboge to be of commercial value must be pure, and as the pure

article can be obtained by the bamboo method much more readily and cheaply, the experiment above described might naturally have been expected to prove unprofitable

CHEMISTRY 70

DESCRIPTION AND CHEMICAL COMPOSITION —The "pipe" gamboge of commerce is found in the form of cylinders 1 to 2½ inches in diameter and 4 to 8 inches in length, with striations lengthwise, caused by impressions from the inside of the bamboo used in collecting These cylinders may be distinct and covered externally with a yellowish brown dust, or may be agglutinated into masses of various sizes The best samples are of a rich brownish orange colour externally, dense and homogeneous, brittle, with a

the colour and consistence of Siam gamboge, but contained many impurities, while fully half the sample was of a dirty yellow brown colour and

able product

Chemically, gamboge consists of a mixture of resin with 15 to 20 per cent of gum The resin dissolves easily in alcohol, forming a clear liquid of a fine yellowish-red hue and acid reaction. Buchner assigns to it the formula $C_{60} H_{35} O_{12}$ Flückiger and Hanbury state that the gum (which they obtained to the extent of 15 8 per cent by completely exhausting the gum-resin with alcohol and ether), was found to be readily soluble in water, not acid in reaction, and therefore not identical with gum arabic As already stated, impurities are of common occurrence—rice-flour, sand, or the pulverised bark of the tree being amongst the most common These mechanical impurities are readily recognised in the residue left after exhausting the gum-resin, while the starchy adulterants are easily detected by adding a solution of iodine to the decoction, a green colour being produced.

DYE Gum-Resin 71

TAN Rind 72

Dye and Tan —The GUM RESIN is employed by the Burmans for dye-

for water colour drawing

OIL Seeds 73

Oil —A semi solid fat of a yellow colour is procurable in moderate

of value to the candle-maker

GARCINIA Morella.

The True Gamboge Tree.

HISTORY.

"the juice of the tree under the Sanskrit name of *Tamála* has long been employed as a pigment for making sectarial marks on the forehead by the Hindús of Kanara and Mysore." Towards the middle of the present century, specimens of Gamboge procured from Indian trees were carefully analysed and critically compared with pure Siam gamboge by chemists both in this country and in England, with the result that the two were declared to be practically identical. Notwithstanding this no attempt appears to have been made to collect the exudation free from impurities, and in such a state that it could compete with success with the pure "pipe gamboge" from Siam.

COLLECTION. 69

Collection.—The gamboge of commerce, which is imported into Europe from Singapore, Bangkok, and Saigon, and is the produce of Siam, Cambodia, and the Southern parts of Cochin-China, is collected in the following way: "At the commencement of the rainy season a spiral incision is made in the bark round half the circumference of a full-sized tree, and the juice, which then slowly exudes for several months, is received into a joint of bamboo, which is placed at the lower end of the incision for that purpose. When the juice has hardened the shell of bamboo is removed, and the gamboge is thus obtained in the form of a roll or cylinder" (constituting the *Roll* or *Pipe Gamboge* of commerce). "According to Spencer St. John, a tree will yield on an average, in a season, sufficient gamboge to fill three joints of bamboo 20 inches in length, by about 1½ inches in diameter. The trees should be incised in alternate years" (*Bentley & Trimen*). "*Cake*" or "*Lump Gamboge*" is obtained either from a similar incision, or by breaking the leaves and twigs, the yellow juice which exudes being collected either on the leaves of the tree or in cocoanut shells. A slightly different account is given by Flückiger and Hanbury quoting Dr. Jamie of Singapore. "The best time for collecting is from February to March or April. The trees, the larger the better, are wounded by a *parang* or chopping knife, in various parts of the trunk and large branches, when prepared bamboos are inserted between the wood and the bark of the trees. The bamboo cylinders being tied or inserted are examined daily till filled, which generally takes from fifteen to thirty days. Then the bamboos are taken to a fire, over which they are gradually rotated till the water in the gum-resin is evaporated, and it gets sufficiently hard to allow of the bamboo being torn off." These methods appear to have been untried in India, answers from forest officers to questions regarding the amount collected and methods of preparation shewing that as a rule minute incisions only are made from which small tears of the gum-resin are obtained. In Ceylon it is usually collected by cutting a thin slice of the size of the palm of the hand off the bark, here and there. On the flat space thus exposed, the gum collects and is scraped off when sufficiently dry. As a consequence only cake gamboge, or the gum-resin in small particles, is obtained, both of which forms are always much less pure than the Siam pipe gamboge. The District Forest Officer of North Malabar reports that, by making small incisions in the bark of a tree 16 inches in diamater, ¼lb of first class pigment was obtained, but the method appears much more laborious, less productive, and more liable to result in the admixture of impurities than that of collecting in bamboos. A consideration of the literature on the subject indicates the advisability of giving the Siam method at least a fair trial.

Another method is reported from Madras, which consists in partially stripping the bark, pounding and boiling it, straining the resulting liquor, and inspissating it over a slow fire. This necessarily laborious and expensive process is said to yield an inferior article though in large quantities. But since gamboge to be of commercial value must be pure, and as the pure

article can be obtained by the bamboo method much more readily and cheaply, the experiment above described might naturally have been expected to prove unprofitable

CHEMISTRY. 70

DESCRIPTION AND CHEMICAL COMPOSITION.—The "pipe" gamboge of commerce is found in the form of cylinders 1 to 2½ inches in diameter and 4 to 8 inches in length, with striations lengthwise, caused by impressions from the inside of the bamboo used in collecting. These cylinders may be distinct and covered externally with a yellowish brown dust, or may be agglutinated into masses of various sizes. The best samples are of a rich

the colour and consistence of Siam gamboge, but contained many impurities, while fully half the sample was of a dirty yellow brown colour, and had a spongy structure, caused by admixture with a substance which appeared to be chlorophyll. There is no doubt, however, that the gum-resins of Siam and India are identical, and that the adoption of the method of collection practised in the former country would result in an equally valuable product.

Chemically, gamboge consists of a mixture of resin with 15 to 20 per cent of gum. The resin dissolves easily in alcohol, forming a clear liquid of a fine yellowish-red hue and acid reaction. Buchner assigns to it the formula $C_{60} H_{35} O_{12}$. Flückiger and Hanbury state that the gum (which

adding a solution of iodine to the decoction, a green colour being produced.

DYE Gum-Resin. 71

TAN. Rind. 72

for water-colour drawing.

OIL. Seeds. 73

OIL.—A semi-solid fat of a yellow colour is procurable in moderate

GARCINIA peduncalata. The Garcinias or Gamboge Trees.

MEDICINE. Gamboge. 74

Medicine.—GAMBOGE is largely employed as a hydragogue and drastic cathartic and anthelmintic. It is particularly valuable in cases of anasarca and other dropsical affections, and in obstinate constipation. In overdoses it is a violent gastro-intestinal irritant poison, and ought to be administered with caution, especially to children. When prescribed alone, it is liable to cause severe griping, and is therefore almost always given in combination with other purgatives and carminatives. Moodeen Sheriff states that Mysore gamboge must be given in half larger doses than the officinal drug, doubtless because it contains a proportion of inert impurities. It is also employed by the natives as an external application to relieve pain and swelling, and Dr. Gray reports that broken pieces of the BRANCHES rubbed up with water are used as a household remedy for boils.

Branches. 75

SPECIAL OPINIONS.—§ "Siam gamboge is one of the best purgatives in India, and a much stronger drug than jalap. Like the latter, it acts very satisfactorily in combination with other purgatives or laxatives; but not so well when used alone. During the last twenty years, I have used this medicine in Triplicane Dispensary with cream of tartar, whenever jalap was out, and never felt the want of the latter. The cheapness and abundance of Siam gamboge in this country is another advantage which it possesses over jalap (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Triplicane, Madras*). "Mixed with other medicines and applied over sprains and contusions, it relieves pain and swelling" (*Surgeon-Major A. S. G. Jayakar, Muskat*). "The stem rubbed with water is a household remedy amongst natives, as a local application to rising pimples and boils, and often cuts them short" (*Civil Surgeon R. Gray, Lahore*).

FOOD. Oil. 76

Food.—The OIL obtained from the seeds is employed by the poor as a substitute for *ghí*.

TIMBER. 77

Structure of the Wood.—Yellow, hard, mottled. Weight about 56lb per cubic foot. Might be useful for cabinet-making.

DOMESTIC. Oil. 78

Domestic Uses.—The OIL is largely employed, with that of G. indica, *Chois.*, for illuminating purposes.

TRADE. 79

Trade.—In the Indian markets the ordinary pipe gamboge is alone met with, value R1-4 per lb (*Pharmacographia Indica*).

80

Garcinia paniculata, *Roxb.; Fl. Br. Ind., I., 266; Wight, Ic., t. 112.*

Syn.—G. BHUMICOWA, *Roxb.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 443; Kurz, For. Fl. Burm., I., 92.*

Habitat.—A tree about 40 feet high, native of the Khásia Mountains, the Eastern Himálaya at Bhotán, and of Chittagong.

FOOD. Fruit. 81

Food.—"The FRUIT is palatable, its taste more like that of a mangosteen than anything else I can compare it to" (*Roxburgh*).

82

G. pedunculata, *Roxb.; Fl. Br. Ind., I., 264; Wight, Ic., tt. 114, 115.*

Vern.—*Tikúl, tikúr,* BENG.; *Borthekra, kiyi thekera tenga,* ASSAM; *Heibúng,* MANIPUR.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 443; Drury, U. Pl., 221; A Note on the Condition of the People of Upper India, Agric. file, No. 6, 1888; Trotter, Report on Ec. Prod., Manipur; Balfour, Cyclop., I., 1176; Agri.-Hort. Soc. India:—Trans., VII., 75; Journ. (Old Series), VI., 27, 39; X., Pro., 40.*

Habitat.—A tall tree of the forests of North-Eastern Bengal, near Rungpur and Goalpara, and of Sylhet. It flowers from January to March, and its fruit ripens from that time to June.

DYE. Fruit. 83

Dye.—Major Trotter, in his report on the Economic Products of Manipur, stated that the FRUIT of this plant was largely employed by the natives of that country to deepen and render fast saffron dye. He described the process as follows: "After the cloth has been dyed with saffron

The Garcinias or Gamboge Trees. (J Murray) GARCINIA succifolia.

DYE

FOOD. Fruit. 84

geously employed during long sea voyages as a succedaneum for lemons or limes, to put into various messes where salt meat is employed, &c

TIMBER 85

Structure of the Wood —The timber is said by Major Hannay to be useful when seasoned (*Note on some of the Forest trees of Upper Assam, Jour Agri-Hort Soc, Ind, VI. (Old Series), 27*)

86

Garcinia speciosa, *Wall, Fl Br Ind, I., 260*

GUM-RESIN. 87

TIMBER 88

89

G. stipulata, *T. And, Fl. Br. Ind, I, 267*

Vern —*Sana-kadan*, LEPCHA

References —*Gamble, Man Timb, 24, Balfour, Cyclop, I, 1176*

Habitat —A tall tree met with in the moist sub tropical forests of the Eastern Himalaya from Sikkim to Bhotán, ascending to an altitude of 4,000 feet.

GUM-RESIN. 90

Gum-Resin —The tree and fruit yield a yellow gum, which does not seem to be used (*Gamble*)

FOOD Fruit 91

Food —The FRUIT produced by this species is yellow, and is sometimes eaten by the Lepchas

92

G. succifolia, *Kurz, For Fl Burm, I, 91.*

The authors of the *Fl Br Ind* (*I, 270*) regard this as a doubtful species, owing to the female flowers and fruits being unknown It is considered by Gamble to be identical with G lonіceroides, *T Anders, Fl Br Ind, I, 264*

rivers

GUM-RESIN. 93

Gum-resin.—This species is said by Kurz to yield little and inferior gamboge.

TIMBER. 94

Structure of the Wood.—White, turning yellowish white, rather heavy, coarsely fibrous, very perishable (*Kurz*).

95

Garcinia travancorica, *Beddome; Fl. Br. Ind., I., 268.*

Syn.—GARCINIA, sp., 2, *Beddome, Flor. Sylvat. Gen., xxi.*

Vern.—*Malampongu*, TINNEVELLY.

References.—*Beddome, For. Man., xxi., Fl. Sylv., t. 173; Gamble, Man. Timb., 23; Cooke, Gums and Gum-resins, 48; Balfour, Cyclop., I., 1176; Indian Forester, III., 21.*

Habitat.—A highly ornamental tree, confined to the forests of the southern portions of the Travancore and Tinnevelly Ghâts, at elevations of from 3,000 to 4,500 feet (*Beddome*).

GUM-RESIN. 96

Gum-resin.—Beddome states that every portion of the tree yields an abundance of bright yellow gamboge. No information, however, regarding the chemical composition or physical characters of this gum-resin is available, and it is therefore not known to what extent it might be utilised as a pigment, dye, or varnish.

97

G. Wightii, *T. And.; Fl. Br. Ind., I. 265.*

References.—*Gamble, Man. Timb., 22; Balfour, Cyclop., I., 1176.*

Habitat.—A native of the forests of Southern India.

GUM-RESIN. 98

Gum-resin.—The gamboge of this species is very soluble, and yields a good pigment (*T. Anderson*).

99

G. Xanthochymus, *Hook. f.; Fl. Br. Ind., I., 269.*

Syn.—XANTHOCHYMUS PICTORIUS, *Roxb.*; X. TINCTORIUS, *DC.*

Vern.—*Dampel, tamal,** HIND.; *Tamal,** BENG.; *Tepor, tezpur, tihur,* ASSAM; *Mandhala,* GARO; *Dampel, onth, osth,* BOMB.; *Jhárambi,* MAR., *Iwara memadi tamalamu, chitakamraku,* TEL.; *Madau,* BURM.; *Tamala,** SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 445; Wight & Arn., Prod., I., 102; Kurz, For. Fl. Burm., I., 93; Gamble, Man. Timb., 23; U. C. Dutt, Mat. Med. Hind., 320; Dymock, Mat. Med. W. Ind., 2nd Ed., 81; Pharmacog. Indica, I., 165; Lisboa, U. Pl. Bomb., 11, 156, 241; Cooke, Gums and Gum-resins, 29; Liotard, Dyes, 95; Darrah, Note on Cotton in Assam, 30, Report on Dyes of Assam; Balfour, Cyclop., I., 1176; Indian Forester, XI., 392.*

Habitat.—A widely distributed species met with in Eastern Bengal, the Eastern Himalaya from Sikkim to the Khásia Mountains, Burma, Southern India, Penang, and the Andaman Islands.

GUM-RESIN. 100

Gum-resin.—This species yields a large quantity of inferior gamboge, both from the stem and fruit-rind. **Roxburgh** states that it is of inferior quality, but it is extensively utilised as a dye in Assam. Lisboa describes the gum-resin obtained from the fruit as follows: "From the full-grown, but not ripe, fruit, a quantity of creamy, resinous, yellow, gum-like gamboge is obtained, which makes a tolerably fair water colour, and might be used either by itself or mixed with blue to form green." No definite account exists of the chemical and physical properties of this gum-resin, but it would seem to contain a larger proportion of gum than that derived from the other species.

DYE. Bark. 101

Dye.—The BARK is employed by the Phakials of the Lakhimpur district of Assam for dyeing cotton. The process which they employ is described by the Deputy Conservator of Forests of the province, as follows:

* **U. C. Dutt** states that the above Sanskrit, Hindústáni, and Bengali names are applied to this plant, as well as to **Cinnamomum Tamala**, *Nees.*

DYE.

"Chips of the bark and the thread, with the leaves of Symplocos grandiflora as a mordant, are boiled, and the colour produced is a bright yellow If the dye thus obtained be mixed with the blue derived from the leaves of

MEDICINE. Fruit. 102

indica). Dymock states that a sherbet made by mixing about 1 oz of this preparation with a little rock-salt, pepper, ginger, cummin, and sugar, is administered in bilious conditions.

FOOD. Fruit 103

Food.—The FRUIT is eaten. Lisboa writes, "The fruit, temptingly beautiful, as big as an orange, smooth and bright yellow, is, however, strongly acid, especially in the fleshy rind The pulp, though less acid, ... therefore,

TIMBER. 104

-colour-ous but

GARDENIA, *Linn.; Gen. Pl., II, 89.*

A genus of shrubs or trees belonging to the Natural Order RUBIACEÆ and comprising about 60 tropical or sub-tropical species Of these from 14 to 20 are natives of India

105

Gardenia campanulata, *Roxb.; Fl. Br. Ind., III., 118; Wight, Ic, t. 578*, RUBIACEÆ.

Syn.—GARDENIA LONGISPINA, *Wall.*, ? G. BLUMEANA, *DC.*

Vern.—*Sethanbaya*, BURM

References.—*Roxb., Fl Ind, Ed, C B C, 238, Kurz, For. Fl, II., 40,*

MEDICINE Fruit 106

DOMESTIC. Fruit. 107

108

G coronaria, *Ham.; Fl. Br. Ind., III., 117.*

THE GARLAND GARDENIA.

Syn.—GARDENIA COSTATA, *Roxb*; ? G CARINATA, *Griff.*

Vern.—*Yeng khat, tsaythambyah*, BURM.

References.—*Roxb, Fl Ind, Ed C B C, 237, Kurz, For Fl Burm,*

OIL. 109

TIMBER 110

111

Gardenia florida, *Linn.; DC., Prodr., IV., 379.*

THE CAPE JASMINE.

MEDICINE. Bark. 112 Pulp. 113 Fruit. 114 Root. 115

A handsome shrub, which, though a native of China, is now extensive cultivated for ornamental purposes in India. In Hindústáni, it is kno as *Gúndha-raj*, and in Burmese as *Thong-sín-pan*.

Medicine.—The Japanese are reported to employ its BARK (*routinacl* and the PULP of its FRUIT as a yellow dye. Dymock states that in t Konkan the ROOT is rubbed into a paste with water, and applied to t top of the head as a remedy for headache during pregnancy; and that is also given internally in hysteria, alone, or combined with *bhâran* (Clerodendron Siphonanthus, *Br.*)

116

G. gummifera, *Linn. f.; Fl. Br. Ind., III., 116.*

Syn.—GARDENIA ARBOREA, *Roxb.;* G. INERMIS, *Dietr.*

Vern.—The gum-resin=*dikmali, dikámli,* HIND.; *Baruri, barúi,* KOL *Bruru,* BHUMIJ; *Papra, kamarri, karmarri,* the gum-resin=*dekámál* C. P.; the gum-resin=*dikamáli,* BOMB.; *Kamarri, dikámali,* GUZ.; t gum-resin=*Kumbai, diká-málli,* TAM.; *Chittamatta, garaga, chiri-bikk* the gum-resin=*tella-manga, chinaká-ringuva,* TEL.; *Bikka gida,* t gum-resin=*dikke-malli,* KAN.; the gum-resin=*Kola-lákada,* SING. the gum-resin=*Kunkham,* ARAB.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 238; W. & A., Prodr., 395 Gamble, Man. Timb., 229; Dalz. & Gibs., Bomb. Fl., 120 (Excl. Syn.) Elliot, Fl. Andhr., 41, 44, 58; Pharm. Ind., 118; Ainslie, Mat. Ind., II 89; Moodeen Sheriff, Supp. Pharm. Ind., 146; Dymock, Mat. Med. W Ind., 2nd Ed., 411; Murray, Pl. and Drugs, Sind, 195; Year-book o Pharmacy, 1878, 73; Drury, U. Pl., 224; Lisboa, U. Pl. Bomb., 86, 162 Birdwood, Bomb. Pr., 44, 269; Cooke, Gums and Gum-resins, 66; P. W. D. Report on Gums, 14, 27, 33, 35; Balfour, Cyclop., I., 1177; Smith, Dic 154; For. Adm. Report, Ch. Nagpore, 1885, 6, 33; Journal Agri.-Hort Soc. Ind. (Old Series), X., 10; Indian Forester, III., 203; X., 222 Settlement Reports:—Central Provs., Chanda Dist., App. VI.; Chhind wara Dist., 110; Gazetteers;—Mysore & Coorg, I., 50; Bombay, XV. pt. I., 436.*

Habitat.—A large shrub met with in Central and South India, from the Satpura Range southwards.

GUM-RESIN. 117

Gum-Resin.—The remarkable gum-resin, *dikamali,* or *cumbi*-gum, is obtained from this species and from G. lucida, *Roxb.* The exudation from both species is apparently identical, and in both cases forms transparent tears from the extremities of the young shoots and buds. These shoots and buds are broken off with the drops of gum-resin attached, and exposed for sale either in this form, or after agglutination into cakes or irregular masses.

Characters. 118

CHARACTERS AND CHEMICAL COMPOSITION.—Commercial *Dikámáli* occurs either in the form of the twigs coated with and agglutinated by the gum-resin, or as irregular earthy-looking masses, of a dull olive-green colour which consist of the resin more or less mixed with bark, sticks, and other impurities (*Cooke*). It has a peculiar and offensive odour like that of cat's urine. When carefully collected and free from impurity it is transparent and of a bright yellow colour. The gum-resin has been examined by Flückiger, Dymock, and later by I. Stenhouse and C. E. Groves, and has been found, by the last two investigators, to contain two distinct resins. One of these, an amorphous greenish-yellow substance, is by far the largest constituent; the other occurs only in small proportion, and is obtained in slender, pale, yellow, crystalline needles. To the latter the name of *Gardenin* has been applied. In the investigation referred to, *gardenin* was separated by boiling the *Dikamali* with alcohol, filtering the solution and allowing the filtrate to cool. The needles thus obtained were washed with cold spirit to free them from the green amorphous resin, and then treated

GUM-RESIN

with light petroleum to remove a fatty impurity which remained. They ... from hot benzine, in which ... om the pure *gardenin* thus

derived by treat...

MEDICINE Resin 119

... been little known to ancient Hindu ... in any of the Sanskrit works on ..., however, to have been known to ... ries, Birdwood referring the καγκαμου of Dioscorides, and Sprengel, the "concamum" of Pliny, to this drug. In no modern European work, however, does there appear to be ...

... foul and callous ulcers, and extensively to keep away flies from sores ... last purpose with ..., and is said to be ...

... applied to the forehead to ...

FOOD Fruit. 120

TIMBER 121

... grained, might serve as a substitute for box-wood.

AGRICULT USE 122

Agricultural Use.—A solution of the gum resin has been recommended by Watson as a sheep-wash.

TRADE. 123

Trade.—*Dikamali* obtained from Southern India, or imported from Arabia, is sold in Bombay at R3-12 per maund of 37½ lb (*Dymock*).

The Dikamali Resin.

124

Gardenia latifolia, *Aiton.; Fl. Br. Ind., III., 116; Wight, Ic., t. 759.*

Vern.—*Pápra, púphar, pepero, ban pindálú,* HIND.; *Papra, papasar, papar,* KOL.; *Popro,* SANTAL; *Kota-ranga,* URIYA; *Gogar,* BHIL; *Pempri,* MAL. (S.P.); *Panniabhil, gúngat, bhandra, geggar,* GOND; *Papra, papadar, popra,* KHARWAR; *Gogar,* C. P.; *Gandru-papura, kariga, phiphar, ghogar, gogarli,* BOMB.; *Ghogar, gogarli,* MAR.; *Kumbay,* TAM.; *Pedda karinga, pureea, bikki, gaiger, karukiti karinguva, konda manga,* TEL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 237; Brandis, For. Fl., 271; Gamble, Man. Timb., 229; Dalz. & Gibs., Bomb. Fl., 120; Elliot, Fl. Andhr., 27, 77, 83, 92, 96, 104; Rev. A. Campbell, Ec. Prod. Chutia-Nagpur, No. 9229; Lisboa, U. Pl. Bomb., 86; For. Ad. Report Chutia-Nagpur, 1885, 32; Indian Forester, III., 203; IV., 343, 345; Gazetteers, N.-W. P., I., 81.*

Habitat.—A small deciduous tree, met with in the dry hilly districts of Western, Central, and South-Western India, also in the North-Western Himálaya, in Garhwál only, where it ascends to 3,000 feet, and in Behar and Western Bengal.

FOOD. Fruit. 125

Food.—"The FRUIT is eaten by the Santals" (*Rev. A. Campbell*).

TIMBER. 126

Structure of the Wood.—White, with a yellowish tinge, close and fine-grained, weight 52 to 53lb per cubic foot. It is easy to work and durable, and has been recommended as a substitute for box-wood, and as likely to be useful for the purposes of the engraver and wood-turner. It is employed by the Natives to make combs.

DOMESTIC. 127

Domestic, &c.—The plant is recommended by Roxburgh as worthy of attention for ornamental purposes. He writes, "Its large, glossy, green leaves, independent of the size, beauty, and fragrance of the flowers, render it highly ornamental."

128

G. lucida, *Roxb.; Fl. Br. Ind., III., 115; Wight, Ic., t. 575.*

Syn.—G. RESINIFERA, *Roth.*

Vern.—*Dikamali,* HIND.; *Konda manga, kokkita, tetta manga, kúrú,* C. P.; *Dikamali,* MAR.; *Dikamali,* GUZ.; *Papar,* BIJERAGOGARH; *Kumbi,* TAM.; *Karinga, karaingi, karung, tella-manga, china karinguva,* TEL.; [The vernacular names for the gum-resin are the same as those applied to the exudation of **G. gummifera,** *Linn.* (which see).]

References.—*Roxb., Fl. Ind., Ed. C.B.C., 237; W. & A., Prodr., 395; Brandis, For. Fl., 271; Kurz, For. Fl. Burm., II., 42; Beddome, Fl. Sylv., Anal. Gen., XV., f. 6; Dalz. & Gibs., Bomb. Fl., 120; Elliot, Fl. Andhr., 39, 177; Pharm. Ind., 188; Ainslie, Mat. Ind., II., 89; Moodeen Sheriff, Supp. Pharm. Ind., 146; Dymock, Mat. Med. W. Ind., 2nd Ed., 411; S. Arjun, Bomb. Drugs, 71; Murray, Pl. and Drugs, Sind, 195; Year-book of Pharmacy, 1878, 73; Drury, U. Pl., 224; Lisboa, U. Pl. Bomb., 86, 251; Birdwood, Bomb. Pr., 269; Cooke, Gums and Gum-resins, 66; Watson, Report on Gums, 3, 14, 27, 33, 35; Balfour, Cyclop., I., 1177; Smith, Dic., 154; Kew Off. Guide to the Mus. of Ec. Bot., 79; Indian Forester, III., 203; VIII., 417; Settlement Reports:—Central Provs. Upper Godavery Dist., 38; Raepore Dist., 76, 77; Gazetteers:—Bombay, XV., pt. I., 70, 436; Central Provs., 504.*

Habitat.—A small deciduous tree, found in Central and South India (common from the Konkan southwards), also in Chittagong and Burma.

GUM-RESIN. 129

Gum-resin.—This species, along with **G. gummifera,** *Linn.*, yields the *Dikamali* or Cambi resin, for a description of which the reader is referred to the article on the latter species.

MEDICINE. 130

Medicine.—See description of the properties of *Dikamali* gum-resin in the article on **G. gummifera,** *Linn.*

FOOD. Fruit. 131

Food.—The FRUIT is said to be an article of food in the Central Provinces.

TIMBER. 132

Structure of the Wood.—Yellowish-white, close-grained, hard, containing no heart-wood, weight 39lb per cubic foot. It is useful for turning, and is employed for making combs by the Natives.

Resin-Yielding Trees. (J Murray) | GARUGA pinnata.

Gardenia obtusifolia, *Roxb, Fl Br Ind, III, 116* — 133

Syn — G SUAVIS, *Wall, Cat, 8274*, RUBIACEA, *Wall, Cat, 8294b*

Vern — *Veng khat, yingat, yinkat*, BURM

RESIN 134

its physical and chemical characters, nor is it known to be of any economic value

TIMBER 135

Structure of the Wood — White, moderately hard, weight 59lb per cubic foot

G. turgida, *Roxb, Fl. Br Ind, III, 118, Wight, Ic, t 579* — 136

Syn — GARDENIA CUNEATA, *Br*, G DONIA, *Ham*

Var — MONTANA, *Roxb (Sp)*, leaves orbicular and densely tomentose beneath G MONTANA, *DC*

References — *Roxb, Fl Ind Ed C B C, 239 Kurz, For Fl Burm II, 41; Beddome, Fl Sylv, Anal Gen, t 15, f 6, Gamble, Man Timb,*

GUM. 137

MEDICINE Root. 138

Rajputana)

TIMBER 139

DOMESTIC 140

SACRED Root 141

Garlic; see Allium sativum, *Linn*; Vol I, 172

Garlic Tree; see Cratæva religiosa, *Forst, var.* Roxburghii, Vol. II, 585

Garnets; see Precious Stones.

GARNOTIA, *Brongn., Gen Pl, III, 1118*

Garnotia stricta, *Brongn*, GRAMINEÆ, *Thwaites, En Pl Zeyl, 363* — 142

A grass met with in the more elevated parts of Central Ceylon; said by Thwaites to be much used for thatching

GARUGA, *Roxb, Gen Pl, I, 323*

Garuga pinnata, *Roxb, Fl Br, Ind, I, 528*, BURSERACEÆ. — 143

Syn — GARUGA MADAGASCARIENSIS *DC*

GARUGA. pinnata.

The Garuga Gum.

Vern.—*Ghogar, kaikar, túm,* HIND.; *Júm, túm kharpat, nil bhadi,* BENG.; *Mohi,* URIYA; *Nia jowa,* KOL.; *Karúr,* BHUMIJ; *Kekkeda,* KURKU; *Kékur,* KHARWAR; *Gendeli poma,* ASSAM; *Chitopoma,* GARO; *Dabdabbi,* NEPAL; *Maldit,* LEPCHA; *Gia,* MICHI; *Kosramba,* MAL. (S.P.); *Gúpni, kekra, gharri,* GOND; *Karolu, ghogar, kaikar,* OUDH; *Kharpat, gurja,* gum=*katila,* N.-W. P.; *Kilmira, kitmira, kharpat, katula, sarota,* KUMAON; *Kharpat, katúla, kilmira, sarota,* PB.; *Kúrak, kanghur,* DEC.; *Gurja,* BANDA; *Kankar, kaikra, ghunja, mahárut,* C. P.; *Kekda,* MELGHAT; *Kákad, kúrak, kanghur,* BOMB.; *Kúrúk, kudak,* MAR.; *Karapti,* KATHIAWAR; *Kúsimb,* GUZ.; *Karre vembú, karvambú,* TAM.; *Garugo, kalugudu, garugu, gárgá,* TEL.; *Hala, bálage,* KAN.; *Katu-kalesjam,* MALAY.; *Mroung-shisha,* MAGH.; *Chinyok, chinyop, hsen-youk,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 370; W. & A., Prodr., 175; Brandis, For. Fl., 62; Kurz, For. Fl. Burm., I., 207; Beddome, Fl. Sylv., t. 118; Gamble, Man. Timb., 66; Grah., Cat. Bomb. Pl., 43; Stewart, Pb. Pl., 45; Rheede, Hort. Mal., IV., t. 33; Elliot, Fl. Andhr., 58, 78; Mason, Burma and Its People, 761; Dymock, Mat. Med. W. Ind., 2nd Ed., 167; Baden Powell, Pb. Pr., 581; Atkinson, Him. Dist., 307, 779; Lisboa, U. Pl. Bomb., 38, 149, 241, 278; Birdwood, Bomb. Pr., 147; Cooke, Gums and Gum-resins, 18; Atkinson, Gums and Gum-resins, 14; Liotard, Dyes, 33; Atkinson, Ec. Prod., N.-W. P. pt. I., 17, part V., 53; Balfour, Cyclop., I., 1162; Indian Forester, I., 83; III., 201; IV., 322; VIII., 414; X., 325; XII., 311; XIII., 120; Gazetteers:—Bombay, VIII., 11; XIII., pt. I., 24; XV., pt. I., 70, 429; N.-W. P., I., 80; IV., lxix.; Burma, I., 137; Aplin, Rep. on Shan States, 1887-88.*

Habitat.—A tree, attaining the height of from 30 to 40 feet, met with in the Sub-Himálayan forest from the Jumna eastwards, where it ascends to 3,000 feet, also in Central and Southern India, Chittagong, and Burma. It flowers from February to March, and the fruit ripens in June and July.

GUM-RESIN. 144

Gum-Resin.—This tree yields a greenish-yellow, translucent exudation in small mamilliform masses, having a mild terebinthinate odour and taste. It has been generally regarded by Indian writers as a true gum, Watson and Cooke, amongst others, classifying it with Gum acacia, &c. Dymock, however, states that it contains small proportions of an oleo-resin, and is in reality a gum-resin. He writes, "Only a small part of it is soluble in rectified spirits, causing a slight turbidity; in water it rapidly disintegrates, forming a tolerably thick mucilage, in which globules of oleo-resin may be seen with the microscope. The insoluble portion is amorphous, flaky, and white; after its removal the mucilage is precipitated milk-white, by rectified spirit." No record exists in economic literature of this exudation being utilised in the arts, but in Bombay it is employed as a medicine. Mr. O'Conor mentions Garuga in his list of trees on which lac is produced.

DYE & TAN. Bark. 145 Leaves. 146

Dyes and Tans.—The BARK is used for tanning in many parts of the country, and is said by Kurz to be good for that purpose. The same writer mentions that in Burma the LEAVES are frequently invested with large, red, obovate, apiculate galls.

MEDICINE. Juice. 147 Stem. 148 Fruit. 149 Leaves. 150

Medicine.—Dymock writes: "In Salsette, near Bombay, the JUICE OF THE STEM is dropped into the eye, to cure opacities of the conjunctiva" (? cornea). "The FRUIT, which is greenish yellow, and about the size of a gooseberry, is pickled and eaten as a cooling and stomachic remedy; it is strongly acid. In the Konkan the JUICE OF THE LEAVES, with that of the leaves of **Adhatoda Vasica** and **Vitex trifolia**, mixed with honey, is given in asthma."

FOOD. Drupe. 151 FODDER. Shoots. 152 Leaves. 153

Food and Fodder.—The fleshy, smooth, black, acid DRUPE is eaten raw, pickled, or cooked by the natives. As above stated, it is considered a semi-medicinal article of diet. The SHOOTS and LEAVES are collected for fodder, especially for elephants.

TIMBER. 154

Structure of the Wood.—Greyish or yellowish, heartwood dark reddish-brown, rather heavy (about 40lb per cubic foot), coarsely fibrous, but

fairly close-grained, takes an indifferent polish, seasons well, but is not durable, and is very liable to the attacks of insects It is accordingly not much used for construction, but is employed for indoor work, such as beams, rafters, &c, and has been recommended for cabinet work It is also extensively used as fuel

TIMBER

Domestic Uses —It is stated in the *Thana Gazetteer* that the soft, elastic bark is much employed for flooring cattle-sheds

DOMESTIC 155

Geese; see Ducks, p. 196.

Gelatine; see Isinglass, Vol IV

Gelidium cartilagineum, *Gaill*, and

G. corneum, *Lam*, ALGÆ, see Isinglass, Vol IV

GELONIUM, *Roxb, Gen Pl, III, 324*

Gelonium lanceolatum, *Willd, Fl Br Ind, V, 459; Wight, Ic,* [*t 1867*; EUPHORBIACEÆ

156

Syn —GELONIUM BIFARIUM, *Wight* (not of *Roxb*)

Vern —*Kakra*, URIYA, *Káru guggilam, suragada*, TEL

References —*Roxb, Fl Ind, Ed C B C, 738 Beddome, For Man 214 (excl syn), Gamble, Man Timb, xxix, Thwaites, En Ceylon Pl,*

TIMBER 157

G. multiflorum, *A. Juss, Fl Br Ind, V, 459*

158

Syn — GELONIUM FASCICULATUM, *Roxb*, SUREGADA GLABRA *Roxb mss* S BILOCULARIS, *Wall*, ROTTLERA FASCICULATA and CONGESTA, *Ham*

Vern —*Ban naringa*, HIND, *Sorugata*, TEL, *Setahanbaya*, BURM

Resin —Roxburgh and Kurz mention that the BUDS of this species exude yellow resin There is no record, however, of this having been collected or utilised in any way

RESIN Buds 159

Structure of the Wood —" White, only fit for house-posts and similar purposes" (*Kurz*)

TIMBER 160

GENIOSPORUM, *Wall, Gen Pl, II, 1172*

Geniosporum prostratum, *Benth, Fl Br Ind, IV, 610,* [LABIATÆ

161

Syn —OCIMUM MENTHOIDES, *Burm*, O PROSTRATUM, *Linn* O MACROSTACHYUM, *Poir*, MENTHA OCIMOIDES, *Lamk*, THYMUS INDICUS, *Burm*

Var —GRACILIS, *Thwaites* (*sp*), G GRACILE, *Benth*

Vern —*Nasel nagai*, TAM

References —*Thwaites, En Ceylon Pl, 237, Grah, Cat Bomb Pl, 148*

Habitat —A herb of the Deccan, from the Konkan southwards, and of Ceylon

Medicine —In Pondicherry this plant is supposed to have febrifugal properties

MEDICINE 162

GENTIANA, *Linn.; Gen. Pl., II., 815.*

A genus of annual or perennial herbs, comprising about 180 species, chiefly natives of the mountains of the Old World. Of these 37 are met with in India. All the members of the genus are to a greater or less extent characterized by the bitterness of their stems and roots, and many are of considerable medicinal value.

163 **Gentiana decumbens,** *Linn.f.; Fl. Br. Ind., IV., 117;* GENTIANACEÆ.

Syn.—G. ADSCENDENS, *Pall.;* PNEUMONANTHE ADSCENDENS, *Schmidt;* DASYSTEPHANA ADSCENDENS, *Borkh.*

References.—*Stewart, Pb. Pl., 147.*

Habitat.—Baltistán and Western Tibet, at altitudes of from 11,000 to 15,000 feet, eastwards to Lahoul, common on the Karakorum. Distributed to Dahuria and Siberia.

MEDICINE. 164 Medicine.—A tincture prepared from this plant has been used as a stomachic by the Lahoul missionaries (*Stewart*).

165 **G. Kurroo,** *Royle; Fl. Br. Ind., IV., 117; Royle, Ill. Him. Bot., t. 68, f. 2, and p. 278.*

Syn.—PNEUMONANTHE KURROO, *D. Don.*

Vern.—*Karú, kútki,* HIND.; *Karú, kútki,* BENG.; *Nilkant, karialphul, nilakil, root=karrú,* PB.; *Phàshánveda, pakánbed,* BOMB.; *Pakhánbhed,* GUZ. According to Dymock, *pakhánbed,* though applied by Muhammadan writers to this plant, is the name associated in Bombay with what appears to be the root of an Iris.

References.—*Stewart, Pb. Pl., 147; Clarke in Jour. Linn. Soc., XIV., 440; Pharm. Ind., 149; O'Shaughnessy, Beng. Dispens., 459; Atkinson, Him. Dist., 313, 737; Kew Off. Guide to the Mus. of Ec. Bot., 98; Gazetteer, Panjáb, Simla Dist., 12.*

Habitat.—A small herb, with a handsome blue flower, common in Kashmir and the North-West Himálaya, altitude 5,000 to 11,000 feet.

MEDICINE. Root. 166 Medicine.—The ROOT is used medicinally as a bitter tonic, and as a substitute for the true Gentian. On the hills it is viewed as a febrifuge, and is largely exported to the plains along with Picrorhiza Kurrooa, *Royle,* as the officinal *karrú* or *kútki,* of which Stewart says 36 maunds were, in 1867, brought from Kullu and exposed for sale at Rampúr. Davies' *Trade Report* gives 20 maunds as annually exported from Peshâwar to Kabul, and Atkinson says that five tons are annually exported from the hills to the plains. It appears probable that the root of this species is very similar to that of G. lutea, which forms the true Gentian of commerce, the chemical composition and medicinal properties of which will be described below.

SPECIAL OPINIONS.—§ "Used principally as a *masálah* for fattening horses" (*Surgeon-Major C. W. Calthrop, M.D., Morar*). "Acts as an aperient in larger doses" (*Civil Surgeon R. Gray, Lahore*). "Said to diminish the fever of phthisis" (*Surgeon J. C. H. Peacocke, I.M.D., Nasik*). "Used for urinary affections" (*Surgeon-Major S. M. Robb, Civil Surgeon, Ahmedabad*).

167 **G. lutea,** *Linn.; DC., Prodr., IX., 86.*

COMMON EUROPEAN YELLOW GENTIAN.

Vern.—*Pakhán-bed,** HIND.; *Juntiyánah,* DEC.; *Jintiyáná,* BOMB.; *Jintiyáná,* ARAB.; *Kon-chad,* PERS.

References.—*O'Shaughnessy, Beng. Dispens., 57; Moodeen Sheriff, Supp. Pharm. Ind., 146; Dymock, Mat. Med. W. Ind., 2nd Ed., 543; Flück. & Hanb., Pharmacog., 434; U. S. Dispens., 15th Ed., 707; Bent. & Trim., Med. Pl., 182; S. Arjun, Bomb. Drugs, 90; Year-Book, Pharm., 1874, 627; Irvine, Mat. Med. Patna, 33; Kew Off. Guide to the Mus. of Ec. Bot., 98.*

* See the remarks on this vernacular name under G. Kurroo.

Habitat.—A handsome perennial herb, native of the alpine and sub-alpine regions of South Europe. The dried root of the plant is imported into India.

[illegible]

MEDICINE Root 168

tions of modern practice. In India also it is extensively employed both by European and Native physicians, but it appears probable that a more careful and exhaustive examination of indigenous species may lead to the substitution of one or more of them for the imported article. As already stated, G. Kurroo appears to be the best known and most widely employed of these native species, and would perhaps, on examination, be found to afford the best substitute.

CHEMISTRY 169

CHEMICAL COMPOSITION.—According to the learned authors of the *Pharmacographia*, the bitter taste of Gentian root is due to a principle, *Gentiopicrin*, $C_{20}H_{30}O_{12}$, which, under the influence of a dilute mineral acid, is resolved into glucose, and an amorphous, yellowish brown neutral substance called *Gentiogenin*. Another constituent is *Gentianin*, $C_{14}H_{10}O_5$, a tasteless substance occurring in yellowish prisms. Besides these the root contains pectin to a large extent, and 12 to 15 per cent. of an uncrystallizable sugar, "of which advantage is taken in Bavaria and Switzerland, for the manufacture, by fermentation and distillation, of a potable spirit." The root contains no tannic acid.

USES 170

ACTION AND USES.—Gentian possesses in a high degree the tonic properties which characterise the simple bitters, of which it is perhaps the [illegible]

pound Tincture.

TRADE 171

Trade.—Dymock states that European Gentian root is obtainable in Bombay for about 4 annas per ℔, while Irvine in his *Materia Medica of Patna* writes "Real Gentian root imported from Turkey, price per ℔ R2 8."

172

Gentiana tenella, *Fries.*, *Fl. Br. Ind.*, *IV*, *109.*

Syn.—GENTIANA PEDUNCULATA, *Royle.* EURYTHALIA PEDUNCULATA, NANA, AND GRACILIS, *Don.*

Vern.—*Tita*, PB.

References.—*Stewart, Pb. Pl., 118; Atkinson, Him. Dist., 313.*

Habitat.—Common in Kashmir and the Western Himálaya, at altitudes from 10,000 to 14,000 feet. Distributed through Arctic and Alpine Europe, and Northern and Central Asia.

MEDICINE. Leaves. 173 Stems 174

Medicine.—Stewart states, on the authority of Atkinson, that in Lahoul a decoction of the LEAVES and STEMS of this and other species is given in fevers.

GEOPHILA, *Don.; Gen. Pl., II., 127.*

[54; RUBIACEÆ.

175

Geophila reniformis, *Don.; Fl. Br. Ind., III., 178; Wight, Ic., t.*

Syn.—GEOPHILA DIVERSIFOLIA, *DC.*; PSYCHOTRIA HERBACEA, *Linn.*; CEPHAELIS HERBACEA, *Kurz.*

Vern.—*Kudi mankani*, SYLHET; *Karinta kali*, MALAY.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 179; W. & A., Prodr., 436; Kurz, For. Fl. Burm., II., 5; In Jour. As. Soc. Ben., 1877, II., 140; Thwaites, En. Ceylon Pl., 150; Dalz. & Gibs., Bomb. Fl., 111; Rheede, Hort. Mal., X., t. 21.*

Habitat.—A small herb met with in Sylhet, the Khásia Hills, the Western Gháts from the Konkán southwards, Tenasserim, and the Andaman Islands. It is also common in the central parts of Ceylon. Distributed through the Malay Archipelago, Southern China, Polynesia, Tropical Africa, and America.

MEDICINE. Plant. 176

Medicine.—Kurz writes that this PLANT possesses qualities similar, though inferior, to those of Cephaelis Ipecacuanha.

GERANIUM, *Linn.; Gen. Pl., I., 272.*

A genus of herbs or undershrubs, belonging to the Natural Order GERANIACEÆ and comprising about 100 species, of which from 18 to 20 are natives of India. Many species are extensively cultivated as flowering plants. The generic name is derived from the Greek γερανος (a crane) owing to the supposed resemblance of the fruit to the head of that bird. Certain species appear to have been known from remote times to possess medicinal virtues. Thus Dioscorides mentions a plant called γερανιον as employed for its astringent properties; Pliny alludes to two species.

177

Geranium nepalense, *Sweet.; Fl. Br. Ind., I., 430; Wight, Ill., I., [155, t. 59;* GERANIACEÆ.

Syn.—GERANIUM RADICANS, *DC.*; G. PALLIDUM and G. PATENS, *Royle*; G. AFFINE, *W. & A.*; G. ARNOTTIANUM, *Steud.*

Vern.—*Bhánda*, HIND.; *Bhánda* (root in bazars=rowil, bhand), PB.

References.—*W. & A. Prod., 133; Stewart, Pb. Pl., 36; Botany of Tour in Hazára in Agri.-Hort. Soc. of Ind. Jour. (Old Series), XIV., 16; Pharmacog. Indica, I., 248; Baden Powell, Pb. Pr., 334; Atkinson, Him. Dist., 307.*

Habitat.—A herbaceous prostrate plant, common throughout the temperate Himálaya at altitudes of from 5,000 to 9,000 feet; found also in the Khásia Hills, the mountains of Southern India, and Ceylon. Distributed to Yunan.

DYE. Root. 178

Dye.—The ROOT, which greatly resembles that of Onosma echioides, affords an abundance of red colouring matter, which is said by Dymock to be employed in colouring medicinal oils. Stewart states that it forms an article of trade, being brought from the hills to the plains of the Panjáb and sold as a dye.

MEDICINE. Plant. 179

Medicine.—The PLANT possesses the astringent properties of the genus, and is employed, at least in the Panjáb, as an astringent, and in certain renal diseases.

Geranium ocellatum, *Camb, Fl Br Ind, I, 433, Royle, Ill, 149, 150* — 180

Syn — GERANIUM BICOLOR and G CHOORENSE, *Royle*
Vern — *Bhand, bhanda*, HIND and PB
References — *Stewart, Jour of a Tour in Hazara, in Jour Agri Hort Soc of Ind (Old Series) XIV, 11, 14, Pharmacog Indica, I, 248, Atkinson, Him Dist, 307, 738*

Habitat — A small straggling herb met with on the temperate and ... nd on the summit of ...

... diuretic properties, ... West Provinces — MEDICINE Plant. 181

G. Robertianum, *Linn, Fl Br Ind, I., 432, Royle, Ill, 151, t 27* — 182

Syn — G LINDLEYANUM, *Royle*
References — *Pharmacog Indica, I, 218, U S Dispens 15th Ed, 1652, Atkinson, Him Dist 307*

Habitat — A fetid, rather succulent annual or biennial herb found in the western temperate Himálaya from Kashmir to Garhwál, at altitudes of 6,000 to 8,000 feet, distributed to Siberia, Asia Minor, the Caucasus, and Europe

Medicine. — This herb, though now almost entirely neglected, was for- — MEDICINE Plant 183

...

G. Wallichianum, *Sweet; Fl Br Ind, I, 430; Wight, Ic, t 324* — 184

Vern — *Liljahri*, N.W P Roots = *Mam i ran*, AFG
References — ... *cog Indica*, ...

... temperate ... 1,000 feet ... "amongst ... to 10,000 ... feet

Medicine — This herb evidently possesses the astringent properties of ... — MEDICINE 185

true *mam-i-ran*, *i.e.*, the roots of Coptis Teeta, *Wall.*" Duthie states that in the villages of Jumnotri it is employed as a cure for toothache.

GERBERA, *Gronov.; Gen. Pl., II., pt. I., 497.*

186

Gerbera lanuginosa, *Benth.; Fl. Br. Ind., III., 390;* COMPOSITÆ.

Syn.—OREOSERIS LANUGINOSA, *DC.; and Wall, Cat., 2929 A. C.;* CHAPTALIA GOSSYPINA, *Royle.*

Var.—PULSILLA, OREOSERIS PULSILLA, *DC.;* O. LANUGINOSA, *Wall, Cat., 2929 B.*

Vern.—*Kapasí, kapasiya*, cloth woven from fibre=*karki, kaffi*, KUMAON; *Gauni*, GARHWAL; *Sung, buchachi*, SIMLA HILLS; *Patpatula, kho, búr, buzli, kapfi, púrjlú, patola, kapasí, bújlo, tsar, kafi, kúfra, kharebúti*, PB.; *Sokhta*, tomentum=*kaff*, MURREE HILLS.

References.—*Stewart, Pb. Pl., 218; Royle, Ill. Him. Bot., 251, t. 59, f. 2; Atkinson, Him. Dist., 312, 793; Royle, Fib. Pl., 302; Cross, Bevan, and King, Rep. on Indian Fibres, 68; Kew Off. Guide to the Mus. of Ec. Bot., 87; Agri.-Hort. Soc. of India Trans., III., 75, Pro., 267; VIII., 272, 276; Jours. (Old Series), VII., Sel. 48; IX., 283, Pro., 139; X., Pro., 135; Gazetteer, Panjáb, Simla District, 12.*

Habitat.—A herbaceous procumbent plant of the Western Himálaya, from Murree to Kumáon, between the altitudes of 4,000 and 8,000 feet. The variety **pulsilla**, which is apparently a starved condition of **G. lanuginosa**, extends to Nepál.

FIBRE. Leaf. 187

Fibre.—The under-surface of the LEAF is covered with a cotton-like tomentum, which is employed by the natives of the Himálaya as tinder, and for the manufacture of cloth. This tomentum has attracted considerable attention at different times, and has been variously recommended as a cloth-making fibre, as a paper-making material, and as a substitute for cotton in the manufacture of explosive compounds. No practical result, however, appears to have been produced by these suggestions, and the fibre is still employed by the natives only. The tomentum is prepared for use as follows:—About the middle of the rains, when the leaf attains its full size, the plant is gathered, the point of the leaf is severed, and the down stripped off towards the base in an entire layer. It is then without further preparation twisted into a thread, on the common perpendicular "*churka*" of the country. From the thread thus prepared a cloth is woven, from which blankets, sacks, and bags are made by the hill people. This cloth has been described as very highly prized for its strength and durability, and superior to that manufactured from hemp. It is very frequently employed also for making the characteristic bags in which the hillmen carry their *hookahs*. The tomentum can only, however, at best be obtained in very small quantities and is of interest as a curiosity only. It can never prove of commercial value.

GEUM, *Linn.; Gen. Pl., I., 619.*

188

A genus of perennial ROSACEÆ, which derives its name from the Greek *γευο*, an agreeable taste, on account of the slightly aromatic flavour of the roots of certain of the species. Two are natives of India, **G. elatum**, *Wall.*, and **G. urbanum**, *Linn.* Neither appears, however, to be recognised in this country as of value, a somewhat remarkable fact in the case of the latter, which is the **Aveus**, Radix Caryophyllata, or HERB BENNET, of old European herbalists. The root of this species has a clove-like odour, and, owing to its stringent properties, has been employed in cases of dysentery, diarrhœa, &c. It was also used to flavour ale in olden times, and has been recommended in cases of caries of the teeth, &c., to impart an agreeable odour to the breath. **G. urbanum** (*Linn.; Fl. Br. Ind., II., 342*) is to be found in India, on the Western temperate Himálaya, from Murree to Kumáon, at an altitude of 6,000 to 11,000 feet.

Ghi or Clarified Butter. (J. Murray) GHI.

GHI.

189

As a consequence, cattle-breeding for dairy purposes is mainly confined to buffaloes

Vern.—*Ghi*, HIND ; *Neyi*, TAM., *Neyi*, TEL ; *Ghrita, ghrittham*, SANS

References.—*Ain-i-Akbari, Blochmann's Trans*, 63, *Voyage of John*

Preparation.—For the following account of the methods of preparation ... stricts of India, the writer is ... N. Mukharji for the Revenue

PREPARATION 190

... re generally followed is thus described . Fresh milk is boiled on a slow fire for five or six hours, being occasionally stirred with an iron spoon to prevent its boiling over, the

Bengal. 191

scraped off the staff, and collected in a separate pot containing water, to allow it to remain cool. Sometimes water is added twice or thrice to the

tarnished silver (a rupee), but none of these are so effective as whey. No

GHI. **Ghi or Clarified Butter.**

PREPARATION. Bengal.

measure can be given for the quantity of water to be added to the curd before churning, as it depends upon the consistency of the latter; generally, however, one quart of water is considered sufficient for three quarts of curd. The water ought to be gradually added during the process of churning. In the cold weather hot water is first added until the butter begins to form, after which cold water is dashed in to expedite the process.

It is not absolutely necessary that the fuel should consist of cowdung. Nor is it necessary that the milk should be heated for five or six hours; indeed, the acid whey or curd is in some places put into raw cold milk. By this process, however, a longer time is necessary to curdle the milk. It is stated that the longer the curdled milk is kept unchurned, the larger is the yield of butter, and that the maximum time for which curdled milk can be kept without deterioration is three days. The proper time for churning is the cool morning hours, as after sunrise the butter does not form into good large lumps, and owing to the heat is liable to get thin and to mix with the whey.

Near large towns where there is a great demand for milk and curd, people sometimes take off the crust or cream and sell the milk in a raw or curdled state. The cream is then churned and the butter obtained is melted into *ghí* in the usual way. Generally speaking, however, the manufacture of *ghí* is confined to villages where there are no purchasers for milk, as it is more profitable to sell milk in the raw state than to convert it into *ghí*.

In certain localities, such as the Monghyr and Bhagalpur districts, butter is extracted by churning the raw milk, either fresh or after being boiled. The milk is then sold either raw or curdled, and *ghí* is made by heating the butter.

In the Tippera district milk is first boiled down to the consistency of a thick hard jelly, thus forming a substance known as *khír* in Bengal and *khoya* in Upper India, which is eaten as a delicacy and enters largely into the composition of most of the native sweetmeats. This substance is ground on a stone, placed in an earthen or a metallic vessel, reduced to a liquid state by mixing water with it, and then churned. The butter thus obtained, when melted, is said to yield a superior quality of *ghí*.

Rajputana 192

In Rajputana.—The process adopted differs somewhat from that detailed above, and is thus described by A. Wingate, Esq., C.I.E., Settlement Officer, Meywar:—

"The milk is slowly boiled on a cowdung cake fire, and occasionally stirred with an iron spoon to prevent it boiling over. A little whey is poured in to make the cream rise. The white curds are then skimmed off and kept in earthen or brass pots till a sufficient quantity is collected. These curds are then poured into a large earthen vessel and some *warm* water added. The churn called 'rawai' is at once put in and worked by a woman. From time to time cold water is freely added. The butter is then collected with the hand into a similar earthen pot, and heated till it melts. The melted butter is then laid aside to cool, and is thenceforth known as *ghí*. The best *ghí* is white, like soft lard, and has no smell, and keeps good for almost any length of time.

"Every household makes its own *ghí*, and the '*chach*' or watered skim milk is much used for drinking at meals with Indian-corn porridge or baked cakes. The villagers, in making *ghí*, mix all their milk up together, whether obtained from the cow, buffalo, or goat, and the shepherd classes also add the milk of their sheep. Consequently *ghí* sold in the bazárs is frequently very strong in smell and taste, and of reddish-yellow colour.

"The amount of *ghí* from a given quantity of milk depends altogether upon the feeding of the cattle. Most families keep one or two milch kine and buffaloes at home and feed them well. Such cattle, they say, give

PREPARATION
Rajputana

about two ounces of *ghí* per seer of buffalo's milk, and one ounce or less

turn of Rajputana *ghí* chiefly depends on the large flocks of sheep reared in this part of the country by Jats, Gujars, and other agriculturists A

Madras
193

ghí made—an average outturn of 50 to 60 per cent of the weight of the butter used, when the butter is made from the milk of the cow The yield of *ghí* from buffalo butter is higher *Ghi* is never made when a fair price can be obtained for milk or
for about 1*s* 10½*d*, and to
quarts of milk of the cow w
of South India, cow's milk
1*s* 3*d* per pound. Thus,

YIELD
194

Assistant Commissioner in the
—"One buffalo
nearly 9 seers
butter When

GHI.

Ghi or Clarified Butter.

YIELD.

warmed and strained, the butter becomes *ghí* and in the change it loses 25 per cent. of its weight. On the average, therefore, each buffalo in milk gives the equivalent of two fifths of a seer ($12\frac{4}{5}$ ozs.) of *ghí* per diem."

In Bundelkhand, Rájputana, and other localities, *ghí* is also made from sheep and goat's milk. That of the latter is inferior, owing to the disagreeable odour it possesses; while *ghí* made from the former is said to be better in many ways than that of the buffalo.

In many parts of the country *ghí* obtained from cow's milk is highly esteemed, owing partly to its superior quality, and partly to its greater purity from a religious point of view. It is, however, always dearer than buffalo milk *ghí*, not so easily procurable, and is moreover more liable to deterioration. It is of a yellowish colour, and has a more pleasant odour and agreeable taste than that prepared from buffalo milk.

The following statement of the comparative yield from different kinds of milk drawn up by the Superintendent of the Government Farm, Cawnpore, may be here given:—

Cattle.	Weight of fresh milk.	Weight of boiled milk.	Weight of curdle.	Weight of Matha (curdle & water).	Weight of Nainu (ram *ghí*).	Weight of *ghí*.	Percentage of *ghí* over fresh milk.
	lb oz.	lb oz.	lb oz.	lb oz.	lb oz.	lb oz.	
Buffalo (first testing)	22 8	21 0	20 14	23 7	1 3	0 $12\frac{1}{8}$	3·47
Buffalo (second testing) . . .	20 0	18 0	17 6	19 2	1 1	0 11	3·43
Cow (first testing) . . .	20 0	17 11	17 0	19 2	0 12	0 8	2·5
Cow (second testing) . . .	20 0	18 1	17 6	19 0	0 13	0 $8\frac{1}{2}$	2·34
Cow (third testing) . . .	10 0	9 0	8 10	9 15	0 6	0 4	2·5
Goat (first testing) .	24 4	22 0	21 8	24 5	0 13	0 $9\frac{1}{2}$	2·44
Goat (second testing) . .	20 0	17 13	17 6	19 10	0 14	0 $8\frac{1}{2}$	2·65
Sheep . . .	6 0	5 8	5 4	6 15	0 6	0 $4\frac{1}{2}$	4·6

ADULTERANTS. 195

ADULTERANTS.—The chief articles employed in adulterating *ghí* are vegetable oils, animal fat, especially mutton-fat, and starches. *Of the last* the commonest are: rice-flour, flour of *bajra* millet (**Pencillaria spicata**), ripe plantain, and the starch obtained from the boiled tubers of **Ipomœa Batatas** and **Colocasia antiquorum**. Of vegetable oils the oils of cocoa-nut, poppy-seed, sesamum, *mahuá* (**Bassia latifolia**), and *kokam* (**Garcinia indica**) are most frequently employed, and occasionally also raw castor-oil. Besides these other impurities occur, resulting from imperfect heating and careless preparation. Several methods of purification are adopted, the commonest being to boil the *ghí*, dash cold water on it while in a state of ebullition, and then to separate the pure oil which on cooling floats on the surface. In Rájputana fresh milk is mixed with the impure *ghí*, in the proportion of one of the latter to four of the former, and the whole process of manufacture is repeated. In certain other localities purification is effected by heating the *ghí* with leaves of lemon.

PACKING. 196

PACKING.—Formerly all *ghí* was packed for local use in earthen jars, and for transport to a distance in leathern cases called *kuppas*. Of late years, however, old kerosine tins, and new tins of the same shape and size, have come into almost universal use in all cases in which the *ghí* is required for transport by sea or rail. In Madras, Rájputana, and Sind, however,

though th
kuppas a
used for
matka
kuppi or of a kerosine t n, and wooden casks, are also employed but only to a limited extent

annum In a population of nearly 300 millions, this rate would give at

rest of India 44 000 tons, —the total amounting to 300 000 tons

MEDICINE 198

Medicine —*Ghrita* has long been regarded as a substance of medicinal

washed with cold water, and the rubbed
soapy frothy fluid, which is used as a liniment It is regarded as cooling and emollient and is much used in nervous diseases such as insanity, epilepsy, neuralgia paralysis cephalalgia and asthma, also in rheumatic affections, stiff joints burning of the body, hands or feet, affections of the

GHI.

Ghi or Clarified Butter.

EDICINE.

eyes, &c." It is much valued as an application for reducing the temperature in high fever.

FOOD. 199

Food.—*Ghí* has long been one of the most important articles of diet of all classes who can afford it in India. Linschoten makes frequent reference to its extensive employment in Sindh, Bombay, and other places which he visited along the coast in his travels. The *Ain-i-Akbari* contains it in the list of more important articles of food during the reign of Akbar, and reference is frequently made to *ghrita* in many ancient Sanskrit works. It is used in much the same way as butter in European cookery, being employed in the preparation of vegetables, curries, pulses, meat, rice *palao*, &c. It is also eaten uncooked with bread or boiled rice, and enters into the composition of the sweetmeats and pastry so extensively consumed by the population of all large towns. The poorer classes reserve the use of *ghí* as a luxury for feast days and festivals, and substitute, for ordinary consumption, some of the sweet vegetable oils.

OMESTIC. 200 SACRED. 201

Domestic and Sacred uses.—In parts of India where vegetable oils are expensive, *ghí* is said to be employed by women for dressing the hair, &c. *Ghí* prepared from cow's milk is largely used in many religious and social ceremonies of the Hindús; thus it is burnt as an offering to the fire-god (*Agni*), and with sandal-wood in Bombay to invoke Lakshmi.

PRICES. 202

Prices and Trade.—Reports submitted at different times to the Revenue and Agricultural Department indicate that, as a rule, the selling price of *ghí* ranges between 5*d*. and 7*d* per ℔. In Bombay, Madras, Calcutta, and other large centres of demand, however, the price ranges as high as 11½ *d*. to 1*s*. for first quality *ghí*; and, as already stated, that prepared from the milk of the cow always fetches a higher price than that made from buffalo milk.

TRADE. 203

Though by far the greatest proportion of *ghí* prepared within the country is consumed in India, a considerable trade exists with trans-frontier countries, and also with foreign ports, principally Mauritius, the Straits Settlements, and other colonies where well-to-do Native emigrants can afford to purchase it. As might be expected from the almost universal consumption of the article, the inter-provincial trade returns shew a large traffic in *ghí*.

Inter-provincial. 204

The following figures indicate the trade by rail and river during the year 1888-89, including the Indus-borne traffic between the Panjáb and Sind, that between Bengal and Assam, by the Brahmaputra and Megna, and the trade to and from Calcutta by river. The North-Western Provinces and Oudh exported 1,88,521 maunds, Bengal 85,587 maunds, Madras 42,019 maunds, the Panjáb 25,633 maunds, the Central Provinces 20,811 maunds, and Berar, Bombay, Assam, and Sind smaller amounts. Of the large towns excluded in the above figures, Calcutta exported 24,903 maunds, Karachi 10,868 maunds, Bombay 4,498 maunds, and Madras 477 maunds. The largest amounts imported were by Calcutta, 1,43,897 maunds, Bombay town 98,894 maunds, Madras seaports 32,907 maunds, Sind (excluding Karachi) 36,047 maunds, Bengal 31,440 maunds, Bombay 29,380 maunds, Rájputana and Central India, 27,840 maunds, and the Panjáb 25,196 maunds.

Trans-frontier. 205

An extensive import trade is carried on with the frontier states, the amount and value of which for the past three years has remained remarkably uniform. The figures are :—

	1885-86.	1886-87.	1887-88.
Amount in cwt. . . .	63,658	54,073	58,591
Value in R	22,56,545	19,39,985	21,20,917

The principal sources of supply are Kashmír and Nepál, the latter of which in 1887-88 supplied 14,995 cwt., the former 34,153 cwt. There is also a small export trade, which, however, is almost entirely confined to Upper Burma, Kashmír, and trans-frontier by the Sind-Pishin Railway, the *ghí*

thus exported being consumed almost entirely by Indian troops and followers

The imports from foreign countries represent a large and constantly increasing trade, but bear a very small proportion to the figures representing the trans-frontier and inter-provincial trades There appears to be little doubt that if a source of cheap supply could be found, the consumption, and consequently the imports from foreign countries, might become very greatly increased The average import for the past five years has been 1,980,709lb, value R7,14,122, in comparison with 431,912 lb, value R1,22,459, of the five years immediately preceding It may be noted also that the imports of the year 1888-89 increased to 2,731,280lb, in comparison with 1,382,389lb in 1884-85 The imports are almost entirely into Bombay and Karachi, the sources of supply are Turkey in Asia, the neighbouring pastoral tracts of Southern Baluchistan, and the shores of the Persian Gulf

As in the case of the trans-frontier trade, the chief foreign markets to which *ghi* is exported are Mauritius, the Straits Settlements, Aden and other similar colonies, where well to do Indian emigrants supply a market A certain amount is also exported to the neighbouring coasts of Africa and Asia, and a small quantity is despatched to the United Kingdom, possibly for re-export to some of the colonies The average export for the past five years has been, 1 938 092lb, value R7,10,287, or almost exactly equal to the average import, and shews little change in comparison with that of the five years ending 1883-84, which was 1 659 613lb, value R7 83,423

Coasting, 207

The coasting trade is a large and increasing one, but, like the trans-frontier exports, its most remarkable feature is the transport of *ghi* to Indian consumers in non producing districts In 1888 89 the total export from Bengal was 1,322,539lb, value R4,87,575, from Bombay 1,181 542lb, value R4 33,303, from Sind 136,465lb, value R49,856, from Madras 2,182,832lb, value R6,88,736, and from Burma 23,068lb, value R9,112 By far the largest importer was Burma, which recorded 3,412,644lb, value R13,05 499, chiefly from Madras and Bengal The probable reason of this large consumption in a country, the Buddhist inhabitants of which do not employ *ghi* as an article of food to any extent, is probably the large and increasing population of emigrants from Madras, Bengal, and other provinces of the main peninsula

Australian, 208

In 1881 an endeavour was made by the Government of India to give an impetus to Indo-Australian trade, by establishing a return trade, the absence of which greatly augments the price of exported Indian goods by causing high shipping rates It was considered that the only article besides animals, timber, and metals, which could profitably be thus sent to India was *ghi*, for the production of which the northern portion of South Australia appeared to possess many advantages **Sir E C. Buck** accordingly drew out a memorandum drawing the attention of the Australians to the subject, and suggesting the methods by which such a trade might be most profitably and advantageously commenced As an outcome of this suggestion, buffaloes and *ghi* makers were asked for, and were supplied by the Government of India in 1883 Experiments were started at Port Darwin, with the result that the buffaloes were found to thrive well and to breed healthy calves, and excellent *ghi* was produced, which obtained a gold medal at the Calcutta Exhibition in 1884 The initial cost was necessarily high in proportion to the smallness of the herd, and accordingly, the success of the experiment from a commercial point of view is not yet established The industry is one, however, that appears to have a hopeful future The demand is a large and constantly increasing one, the climate of the northern territory of South Australia is admirably suited

TRADE IN GHI. for buffaloes, and if managed with due attention to the prejudices of the consumers, and by the help of imported Indian labour, there appears to be every likelihood of such an enterprise affording a good return.

GIGANTOCHLOA, *Kurz; For. Fl. Burm., II., 555.*

A genus of evergreen densely tufted bamboos, which are employed for the same purposes as other members of the Tribe BAMBUSEÆ. For information regarding these the reader is referred to Vol. I., 370. The following are the principal Indian species:—

209 **Gigantochloa albo-ciliata,** *Kurz; For. Fl. Burm., II., 555;* [GRAMINEÆ.

Syn.—OXYTENANTHERA ALBO-CILIATA, *Munr.*
Vern.—*Wapyugale*, BURM.
Habitat.—Common in the mixed forests of Pegu and Martaban.

210 **G. andamanica,** *Kurz; For. Fl. Burm., II., 556.*
Vern.—*Podák*, AND.
Habitat.—Common in the mixed forests of the Andamans.

211 **G. auriculata,** *Kurz; For. Fl. Burm., II., 557.*
Vern.—*Talaguwa*, BURM.
Habitat.—An evergreen arboreous tufted bamboo, found in the low forests of Southern Pegu, but rather rare, cultivated in villages of Arracan and Chittagong. A useful timber with very strong stems.

212 **G. macrostachya,** *Kurz; For. Fl. Burm., II., 557.*
Vern.—*Wanet*, BURM.
Habitat.—Not unfrequent in the tropical forests of Martaban and Tenasserim, also cultivated in the villages of the Irrawaddi valley and of Arracan.

Ginger; see Zingiber officinale, *Roscoe;* SCITAMINEÆ.

Ginger Grass; see Andropogon Schœnanthus, *Linn.*, Vol. I., 249.

Gingelly Oil, a name in India for an oil obtained from Sesamum indicum, *DC.;* PEDALINEÆ, which see.

GIRARDINIA, *Gaud.; Gen. Pl., III., 384.*

A genus of annual or perennial herbs, belonging to the Natural Order URTICACEÆ.

213 **Girardinia heterophylla,** *Dcne.; Fl. Br. Ind., V., 550; Wight, Ic., t. 687;* URTICACEÆ.

THE NI[illegible] TTLE.
Syn.—U[illegible] *Vahl.;* U. DIVERSIFOLIA and HORRIDA, *Link.;*
Var. PAL[illegible] TEROPHYLLA, *Wight;* U. ZEY-
Var. ZEYL[illegible]
LANICA,
Vern.—*A*[illegible] *á su*[illegible]*at*, ASSAM; *Serpa, herpa,* [illegible] *[illegible]una, awa-bichhu,* KUMAO[illegible] [illegible]HWAL; *Ein, keri, kingi, s*[illegible] *[illegible]ati,* MAR.; *Ana chorig*[illegible]; *Gass-kaham-*[illegible] *ya,* SI[illegible]
[illegible] *or. Fl., 404;* [illegible] *tewart, Pb.* [illegible] *. Dist., 317,* [illegible] *a, U. Pl.,*
nc
ble,
215

Bomb, 234, *Royle, Fib Pl*, 367-372, *Liotard, Paper making Mat*, 512 *Forbes Watson, Rep on Rheea Fibre*, 1875, 39, *On the Preparation and Use of Rheea Fibre*, 1883, 35 *Watt, Sel from the Rec of the Govt of India*, 177, 260, 319, *Agri Hort Soc of India, Trans* VIII, 75, 275 *Jours* (*Old Series*), VI, 44, VII 223, *Spons' Encyclop*, 999, *Balfour, Cyclop*, I, 1207 *Indian Forester*, XII, *App*, 21, XIV, 269, 273, *Special Reports from Forest Department, N-W P, Madras, and the Panjab*

Habitat—A tall, stout, erect, tufted herb, from 4 to 6 feet high, exceedingly common in the temperate and sub-tropical Himálaya, from Marri eastwards, ascending to an altitude of 5,000 feet It is also to be met with in Assam, Sylhet, and Burma, and extends from Marwar and Central India to Travancore and Ceylon The variety **palmata** is a native of the Nilghiri hills and Ceylon, while **zeylanica** is confined to the latter locality and parts of the Deccan

FIBI 21

Fibre—Considerable confusion exists in the literature of the fibres yielded by this species, apparently owing to a neglect of the fact that the three varieties afford fibres which are perfectly distinct in many of their characters It is, therefore, necessary in the present article to consider the varieties separately, as far as the fibre of each is concerned

G. heterophylla proper—The Himálayan nettle is extensively employed in the localities where it abounds "Its stems are often employed for making twine and ropes by the dry process, but these are not prized, and perish quickly from wet" (*Stewart*). "Yields a fine strong fibre, much used for cordage and twine, but cannot stand much moisture" (*Atkinson*)

Dr Forbes Watson, in his report upon Rheea Fibre, publishes under this species certain facts regarding what appears to be the fibre of *var.* **palmata** and reproduces Wight's plate of *var* **zeylanica** as representing the typical species This same mistake has been made by other authors, all the economic information regarding Girardinia being confused and given under one or other of the above names Under the heading of "Other Himálayan Nettles," **Dr Royle** gives certain facts regarding what appears to be the fibre now under consideration Having arrived at the conclusion that the *horú surat* of Assam was identical with the fibre of the Nilghiri nettle of Southern India, he apparently could not reconcile himself to class with these the *bangra* cloth of Sikkim, nor the fibre from which the *babar* of the Himálaya was made. Presumably, therefore, he merely classed the Assam fibre with that of the Nilghiri nettle from descriptions he had received, and not from actual observation Had he actually seen the fibre he must have assigned it a place with the fibres of the North-West Himálaya nettle, with which it is in reality identical The following description of the method of preparation pursued near Simla, given by **Captain Rainey** and quoted by **Royle**, may be here reproduced, as being the most complete account available; "In August and September, when the plant is in perfection, it can be obtained in any quantity, running from five to six or seven feet in height." "The following is the preparation to which the article is subjected by the natives of the place, but, I doubt not, much of the process might be omitted or simplified:—

"*1st*—Being cut in August or September the weed is exposed for *one* night in the open air.

"*2nd*—The stalk is then stripped of leaves and dried in the sun.

"*3rd*—When well dried it is deposited in an earthen pot which contains water mixed with ashes (the refuse remains of any wood fire) and boiled for four and twenty hours.

"*4th*—The stalk thus boiled is then taken to a stream and well washed

"*5th*—The hemp is then brought home, and being sprinkled with flour (*atta*) (of the grain called *Koda*) it is again dried in the

The Nilghiri Nettle.

FIBRE.

sun, and afterwards spun at any time into cords for nets of every description."

In Garhwál and other localities in the North-West Himálaya, a simpler method appears to be followed. The plant is cut down in the beginning of the cold season, the stalks are washed three or four days in water, and the fibre is stripped off like that of hemp. It is a fine, white, glossy, silky fibre, but is coarser and more brittle than that yielded by *var.* **palmata.** According to **Captain Rainey** it is extensively employed in the preparation of twine for fishing-nets, in consequence of the virtue ascribed to it by the Natives of gaining increased strength by immersion in water, and of resisting decay longer than other fibres. It is also used in Sikkim for the manufacture of a coarse cloth like gunny.

Var. **palmata**—the true Nilghiri nettle—yields a finer and more valuable fibre than **G. heterophylla** proper. **Royle** writes: "The fibre is very long white, soft, and silky, and has been much admired by many of the best judges of fibres. The hill people on the Nilgiri hills prepare the fibre by boiling the twigs. **Dr. Wight** says of it that 'it produces a beautiful fine and soft flax-like fibre, which the Todawars use as a thread material, and if well prepared is fitted to compete with flax for the manufacture of even very fine textile fabrics.'

"At Dundee it was thought a very good fibre, but rather dry. **Mr. Dickson**, who has passed it through his machine and liquid, has rendered it like a beautiful, soft silky kind of flax, and calls it a wonderful fibre, of which the tow would be useful for mixing with wool as has been done with the China-grass, and the fibre used for the finest purpose." **Dr. Forbes Watson**, speaking of what is apparently this variety, says: "The remarks made with respect to the rough character of the Rheea fibre are still more applicable to those of the Nilghiri nettle. Indeed, so similar to wool is its fibre that when cut short and crumpled up or 'scribbled,' I have known it valued by an experienced broker as wool, and its price stated accordingly. The term 'vegetable wool' which it has already received is, therefore, very suitable." The same writer gives the mean diameter of the ordinary fibre as $\frac{1}{570}$ and the ultimate fibre as 1 $\frac{1}{500}$ of an inch; and **Cross, Bevan, and King** give the following analysis: "Moisture 7·3, ash 1·5, hydrolysis (*a*) 2·5, (*b*) 9·7, cellulose 89·6." In **Spons'** *Encyclopædia*, the Girardinias are spoken of collectively under the name of **G. heterophylla**, but it seems that **G. palmata** alone is meant. The following extract may be found useful: "It succeeds well by cultivation. The bark abounds in fine, white, glossy, strong fibres, which have a rougher surface than those of **Bœhmeria nivea**, and are therefore more easily combined with wool in mixed fabrics." Owing to the high percentage of cellulose and the small loss from hydrolysis, the fibre is chemically one of the best produced in India.

The late **Mr. M'Ivor**, of the Government gardens, Ootacamund, experimented with the Nilghiri plant and submitted a most interesting report to the Madras Government. The following extract from *Drury's Useful Plants* will be found to contain briefly the more important facts from **Mr. M'Ivor's** report:—

CULTIVATION 215

"**Cultivation.**—The Nilghiri nettle has been described as an annual plant; it has, however, proved, at least in cultivation, to be a perennial, continuing to throw out fresh shoots from the roots and stems with unabated vigour for a period of three or four years. The mode of cultivation, therefore, best suited to the plant, is to treat it as a perennial by sowing the seeds in rows at fifteen inches apart, and cutting down the young shoots for the fibre twice a year,—*viz.*, in July and January. The soil best suited to the growth of this plant is found in ravines which have

received for years the deposit of alluvial soils washed down from the neighbouring slopes. In cutting off the first shoots from the seedling crop, about six inches of the stem is left above the ground, this forms 'stools' from which fresh shoots for the succeeding crops are produced After each cutting the earth is dug over between the rows to the depth of about eight inches, and where manure can be applied it is very advantageous when dug into the soil between the rows with this operation When the shoots have once begun to grow, no further cultivation can be applied, as it is quite impossible to go in among the plants, owing to their stinging property The plant is indigenous, growing all over the Nilghiris, at elevations varying from 4 000 to 8,000 feet This indicates the temperature best suited to the perfect development of the fibre

'*Produce per acre*—From the crop of July an average produce of from 450 to 500lb of clean fibre per acre may be expected Of this quantity about 120lb will be a very superior quality, this is obtained from the young and tender shoots, which should be placed by themselves during the operation of cutting The crop of January will yield on an average 600 or 700lb per acre, but the fibre of this crop is all of a uniform and somewhat coarse quality, owing to shoots being matured by the setting in of the dry season in December It might therefore, be advantageous where fine quality of fibre only is required, to cut the shoots more frequently, probably three or four times in the year, as only the finest quality of fibres is produced from young and tender shoots

"PREPARATION OF THE FIBRE.—Our experiments being limited, our treatment of the fibre has been necessarily very rude and imperfect, as in this respect efficient appliances can be obtained only in extensive cultivation

PREPARATION 216

"The inner bark of the whole plant abounds in fibre, that of the young shoots being the finest and strongest, while that of the old stems is comparatively short and coarse, though even they produce a fibre of very great strength and of a peculiar silky and wooly like appearance, and one which no doubt will prove very useful in manufactories

"For cutting down the crop fine weather is selected, and the shoots when cut are allowed to remain as they fall for two or three days, by which time they are sufficiently dry to have lost their stinging properties, they are, however, pliable enough to allow of the bark being easily peeled off the stems and separated from the leaves. The bark thus taken from the stems is tied up in small bundles and dried in the sun, if the weather is fine, if wet is dried in an open shed with a free circulation of air When quite dry, the bark is slightly beaten with a wooden mallet, which causes the outer bark of that in which there is no fibre to break and fall off The fibrous part of the bark is then wrapped up in small bundles, and boiled for about an hour in water to which a small quantity of wood ashes has been added in order to facilitate the separation of the woody matter from the fibre The fibre is then removed out of the boiling water and washed as rapidly as possible in a clear running stream, after which it is submitted to the usual bleaching process employed in the manufacture of fibre from flax or hemp *Report, April 1862*" (*Drury's Useful Plants, 225*)

Var **zeylanica**—Little is known regarding the fibre of this variety, although it is used in the Konkan and other parts of Western and South-Western India It would appear, however, that it is very similar to that produced by the true Nilghiri nettle, described above

There is no doubt that these fibres are perhaps the strongest, and in many ways most valuable, of any produced in India, a very serious practical difficulty exists, however, against their extensive use in the stinging hairs with which all the varieties are abundantly provided These cause

PREPARATION.

great annoyance to the persons employed in extracting the fibre, and even after being manufactured into cloth, the irritant property may not be completely destroyed. Indeed, in many cases, it persists to such an extent as to cause great irritation to the person wearing or even touching the cloth.

FOOD. Leaves. 217

Food.—The LEAVES of G. heterophylla proper are said to be largely used as a vegetable in the hilly tracts of the North-West Provinces.

GIRONNIERA, *Gaud.; Gen. Pl., III., 356*

218

Gironniera reticulata, *Thw.; Fl. Br. Ind., V., 486;* URTICACEÆ.

Syn.—GIRONNIERA CUSPIDATA, *Kurz;* SPONIA SUBSERRATA, *Kurz;* APHANANTHE CUSPIDATA, *Planch;* GALUMPITA CUSPIDATA, *Blume;* CYCLOSTEMON CUSPIDATUM, *Blume;* HELMINTHOSPERMA GLABRESCENS, *Thwaites, mss.;* CELTIS RETICULATA, *H.f. & T.*

Vern.—*Kho manig;* NILGHIRI HILLS; *Koditáni,* TAM.

References.—*Kurz, For. Fl. Burm., II., 470; Beddome, Fl. Sylv., t. 313; Gamble, Man. Timb., 324; Balfour, Cyclop., I., 1208; Indian Forester, II., 21, 22, III., 23.*

Habitat.—A lofty tree, native of the Sikkim Himálaya, at altitudes of 1,000 to 3,000 feet; also met with in Assam, the Khasia Mountains, Upper Burma, South-Western India, and Ceylon; distributed to Java.

TIMBER. 219

Structure of the Wood.—"Very hard and heavy, a valuable engineering timber" (*Beddome*).

GISEKIA, *Linn.; Gen. Pl., III., 80.*

220

Gisekia pharnaceoides, *Linn.; Fl. Br. Ind., II., 664; Wight, Ic., [II. 1167, 1168;* FICOIDEÆ.

Syn.—GISEKIA MOLLUGINOIDES, *Wight;* G. LINEARIFOLIA, *Schum;* PHARNACEUM OCCULTUM, *Forsk.*

Vern.—*Manalie kirai, nummuelli kirai,* TAM.; *Isikedunti kúra, isaka dásari kúra,* TEL.; *Aetrilla palla,* SING.

References.—*Kurz, in Journ. Linn. Soc., 1877, pt. II., 111; Elliot, Fl. Andhr., 71; Pharm. Ind., 183; Drury, U. Pl., 227; Lisboa, U. Pl. Bomb., 200; Birdwood, Bomb. Pr., 69; Home Dept. Cor., regarding Pharm. Ind., 240; Gazetteer of the N.-W. P., I., 83; IV., lxxii; Indian Forester, III., 236; Jour. Agri-Hort. Soc. of India (Old Series) IX., 285.*

Habitat.—A glabrous herb found in the Panjáb, Sind, South India, and Ceylon, distributed to Ava, Afghánistan, and Africa.

MEDICINE. 221

Medicine.—The medicinal virtues of this plant were first brought to notice by Captain W. H. Lowther, in the Journal of the Agri-Horticultural Society of India above cited. He claimed for it strong anthelmintic properties, and considered it, when properly administered, a specific for tænia or tape-worm. The treatment is described as follows: "I prefer the administration of the remedy when the plant is forming its seed vessels (all vegetable products being then fullest of their medicinal virtues). An ounce or more of LEAVES, STALKS, and CAPSULES, taken indiscriminately, are ground in a mortar, and sufficient water is added to form a draught. The patient should fast for twelve hours previous to taking the medicine, and three such doses should be given, one every four days. To destroy any latent germs, give for precaution's sake additional doses for two fortnights following." Captain Lowther's estimate of the drug is very high, and his results with the fresh plant, which he urges must alone be used, since it loses its value on drying, appear to have been good. As yet, however, no medical evidence in favour of the alleged virtues of Gisekia have been adduced, and in the Home Department correspondence, on the advisability of bringing out a new edition of the Indian Pharmacopœia, none

Leaves. 222
Stalks. 223
Capsules. 224

of the authorities consulted appear to have recommended the retention of this drug.

MEDICINE.

Food.—Balfour states that the LEAVES are used by natives in the preparation of *dál*, and Lisboa mentions that in time of famine they are employed as a pot-herb.

FOOD Leaves. 225

GIVOTIA, *Griff.; Gen. Pl., III, 297*

Givotia rottleriformis, *Griff.; Fl. Br. Ind., V., 395; Wight, Ic.,* [*t. 1889*, EUPHORBIACEÆ.

226

Syn.—GOVANIA NIVEA, *Wall.*

Vern.—*Vendale, butalli, bulali*, TAM.; *Tella púnki, tella ponuku*, TEL.; *Polki*, MALAY.

Ref [illegible]

Habitat.—A small tree of the Dekkan, Mysore, the Eastern Ghats and Ceylon.

Oil.—The SEEDS yield an oil, which is valuable as a lubricant for fine machinery.

OIL Seeds. 227

Struc[illegible] grained [illegible] figures, [illegible] catamara [illegible] its surface takes paint readily.

TIMBER. 228

GLASS.

229

Vern.—*Kanch*, HIND.; *Kunnadi*, TAM.; *addanmú*, TEL.; *Shishah*, PERS.; *Kizaz*, ARAB.

Glass is a mixture of silicate of potassium or sodium, or of both, with one or more silicates insoluble in water, such as those of the alkaline earths, aluminium, manganese, iron, or lead. The mixture is effected by fusion, which takes place less readily the more silica it contains. Silica for the manufacture of glass is obtained from ground quartz or flint, or from silicious sand, treated with a mineral acid to free it from metallic impurities. The alkali is derived from pearl-ash or wood-ash, carbonate of soda, [illegible]

HISTORY. 230

[illegible]

requirements of Europeans; and glass drinking [illegible] by the native population, indeed, by Hindus [illegible] on religious grounds. A serious difficulty in the way of the [illegible]

GLASS.

Glass and Glass-ware.

HISTORY.

glass-making industry in this country is the lack of fuel Mr. Baden Powell remarks on this subject, "It would probably be cheaper to carry such glass-making materials as are to be found in the Panjáb to the hearths of Staffordshire and bring them back made up into glass than to attempt the manufacture on a large scale here." Evidence, however, exists of glass-making having formerly existed on a much larger scale than it does at present. At the time of the composition of the *Yajur-veda* glass was one of the articles from which the ornaments of females were made. The substance is also mentioned in the *Mahábharata*. In the *Ain-i-Akbari* glass for windows is included in the list given by its author of building materials, and it is said to have cost R1 for 1¼ s'er or 4 *dam* for one pane. Abul Fazl in his descriptions of Behar and Agra also mentions glass-making, and writes of Allore, "Here are considerable manufactures of woollen carpets and glass." A glass *guláb* bowl and a *hukka* bowl found in the Muhammadan capital, Bijapur, were shewn by Major Cole, R.E., at one of the Simla Art Exhibitions. These he described as probably of the sixteenth century. They were of thick white glass, cut or moulded in a hexagonal diaper pattern with fluted necks, and of undoubtedly Indian design, though of far superior workmanship to anything produced in this country of late years. Now-a-days, indeed, the glass-making industry is almost entirely confined to a few families in the Lahore, Karnál, Jhelam, and Hoshiárpur districts of the Panjáb; in the Bijnor and Sahàranpur districts, N.-W. P.; in Lucknow; in Ahmadnagar, Kaira, and Baroda in Bombay; in Seoni, Central Provinces; in Patna, Bengal; in Jeypore; and in the North Arcot District of Madras. In these localities the glass-makers for the most part, confine their manufactures to rude globes, silvered inside with mercury and tinfoil, small coarse glass toys, rude bottles for attar, and to a greater extent beads and bangles. In Karnál the large, thin, pear-shaped glass retorts or carboys in which the native manufacture of Salammoniac is effected are also prepared.

In some parts of the country, however, the industry appears to have reached a higher development, as will be seen from the following short descriptions taken from the *Journal of Indian Art*: "Very curious coloured glass-ware is made at Patna. The specimens shewn at the Calcutta Exhibition were of considerable excellence. These articles would have an extensive sale if better known, and if proper facilities were afforded to the public for obtaining them." "In Delhi and Lahore glass bangles and lamp chimnies are made; in Karnál, glass globes, pear-shaped glass carboys; and various wares in Hoshiarpur. The art is as yet quite in its infancy. The Hoshiarpur workman is almost the only one of these who works independently with his own materials—independently, that is, of foreign aid—for the few glass-blowers in Lahore collect fragments of white European glass, and melting them down, blow cheap lamp chimnies and bottles. At Karnál the glass globes are made which when silvered inside are broken up into the small mirrors used in *shishadár* ornamental plaster, and run into embroideries known as *shishadár phulkaris*."

Patna ware. 231

Delhi ware. 232

Lahore ware. 233

But the following passage is even of greater interest, since perhaps it describes the only branch of the industry worthy of the name of art-manufacture: "Kapadnanj, in the Kaira district, is the only place in the Bombay Presidency where glass is manufactured in its primitive state from a natural earth called *us*, which is a mixture of the Carbonates and Silicates of Soda with several mineral impurities. It is, however, remarkable for its iridescent properties and good colour, resembling the antique Venetian. The shapes are quaint and beautiful. It is said that crude glass of the value of about 3 lakhs of rupees is annually sent to Bombay for foreign export by some Bhoras and Banias, and that it is

Kapadnanj. 234

Beads. 235

HISTORY.

purified and turned into various shapes in the glass manufactories of Europe It would be interesting to find out some more definite statistical account of this trade, which, though at present represented by a few pots and bottles, may, if well regulated, develop into an important item of the manufactures of Bombay" With reference to the remark regarding the

Bangles. 236

colours are made at Jeypore and in many other places in the State They are worn by Mussulmans."

About ten years ago endeavours were made by the Department of

indus-

mate-

ing the

as spe-

cially deputed to conduct experiments, beads for patterns, tools, and an account of the methods employed in Venice were obtained, and furnaces constructed on the English pattern were tried

It was found as the result of these experiments—

(1) That the *reh* was not sufficiently pure to make good colourless window glass

(2) That the *reh*, when heated in a good furnace, yielded a material

(3) T

greater expense The last result is particularly disappointing, since, as already remarked, beads and bangles are the only form of glass for which a really large demand exists amongst the native population of India.

TRADE 237

Trade.—A large and increasing import trade exists in glass In the year 1888-89, 6,407,266 superficial feet of sheet and plate glass was imported, value R5,61,550; 27,993 cwt of beads and false pearls, value

is small, amounting in value to from R29,910 in 1884-85 to R41,810 in 1888-89 Of this R36,956 worth was exported by Bombay, and R11,262 imported by Aden, which appears to be the chief market.

Glazed pottery; see **Clay**, II., 367.

GLOCHIDION, *Forst*; *Gen. Pl.*, *III*, 272.

A genus of evergreen trees or shrubs belonging to the Natural Order EUPHORBIACEÆ, and comprising about 120 species, chiefly natives of tropical Asia Of these 55 are Indian, few are known to be of economic value.

238 **Glochidion lanceolarium,** *Dalz.; Fl. Br. Ind., V., 308; Wight, [Ic., t. 1905;* EUPHORBIACEÆ.

Syn.—PHYLLANTHUS LANCEOLARIUS, *Muell.;* GLOCHISANDRA ACUMINATA, *Wight;* BRADLEIA LANCEOLARIA, *Roxb.*

Vern.—*Bhoma,* BOMB.

References.—*Roxb., Fl. Ind., 692; Brandis, For. Fl., 453; Kurz, For. Fl. Burm., II., 343; Beddome, For. Man., 192; Balfour, Cyclop., I., 1212.*

Habitat.—An evergreen tree from 25 to 30 feet in height, found in the forests of North-West India from Nepál eastwards to Assam, also in Sylhet and Chittagong (*Fl. Br. Ind.*). Beddome states that it occurs in Malabar, the Konkán, and South Kanara.

TIMBER, 239 — Structure of the Wood.—Hard and durable, employed by the natives of the Bombay Gháts and Eastern India for house-building.

240 **G. velutinum,** *Wight; Fl. Br. Ind., V., 322; Wight, Ic., t. 1907-12.*

Syn.—PHYLLANTHUS VELUTINUS, *Muell. Arg.;* P. NEPALENSIS, *Muell. Arg.;* BRADLEIA OVATA, *Wall.*

Vern.—*Mowa, bakalwa,* N.-W. P.; *Pándna, kalaon, gol kamíla, samá, bera, amblú, kodmil,* PB.; *Kari, koria,* C. P.

References.—*Brandis, For. Fl., 453; Kurz, For. Fl. Burm., II., 344; Beddome, Forester's Man., 195; Stewart, Pb. Pl., 196.*

Habitat.—A small tree or shrub, native of the hot valleys of the Himálaya, Burma, the Khasia Mountains; also the Deccan from the Konkán to the Nilgiri hills.

TAN, Bark. 241 — Tan.—The BARK is employed for tanning in the North-Western Himálaya.

TIMBER, 242 — Structure of the Wood.—Brownish-white, compact, but soft. Used for fuel.

GLORIOSA, *Linn.; Gen. Pl., III., 830.*

243 **Gloriosa superba,** *Linn.; Baker in Linn. Soc. Jour., XVII., 457; [Wight, Ic., t. 2047;* LILIACEÆ.

Syn.—GLORIOSA ANGULATA, *Schum.;* METHONICA SUPERBA, *Lam.*

Vern.—*Kariári, karihári, lánguli, kulhári,* HIND.; *Bishalánguli, ulatchandal, bisha,* BENG.; *Siric samano,* SANTAL; *Kúrihári,* N.-W. P.; [illegible] *Mulim, kariári,* PB.; *Rájahrar,* AJMERE; [illegible] *Karianag,* BOMB.; *Nágkaria, indai,* MAR. [illegible] *kárttikaik-kishangu,* TAM.; *Agni-skikha, kalap* [illegible] *potti dumpa,* TEL.; *Ventóni, mendoni,* MALAY.; [illegible] *Lángaliká, agnisikhá, hsee-mee-touk,* BURM.; *Neyangalla,* SING.; *kalikari,* SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 288; Stewart, Pb. Pl., 235; Elliot, Fl. Andhr., 11, 12; Rev. A. Campbell, Ec. Prod. of Chutia Nagpur, No. 9497; Mason, Burma and Its People, 429, 814; Pharm. Ind., 242; Moodeen Sheriff, Supp. Pharm. Ind., 147; U. C. Dutt, Mat. Med. Hind., 263, 307; Dymock, Mat. Med. W. Ind., 2nd Ed., 832; S. Arjun, Bomb. Drugs, 145; Atkinson, Him. Dist., 319, 738; Lisboa, U. Pl. Bomb., 270; Birdwood, Bomb. Pr., 91; Balfour, Cyclop., I., 1212; Indian Forester, II., 27; XII., App., 21; Home Dept. Cor. regarding Pharm. Ind., 230, 240, 290; Gazetteers:—Mysore and Coorg, I., 67; II., 7; III., 18; Bombay, XV., 444; N.-W. P., I., 85; IV., lxxviii.*

Habitat.—A large scandent herb, grasping by the tips of its leaves; found in the forests of India, Burma, and Ceylon, ascending to 6,000 feet. It produces a large and very handsome flower, during the rains.

MEDICINE. Root, 244 — Medicine.—The ROOT is supposed by Hindu and Muhammadan physicians to have valuable medicinal properties. Dutt writes, "It constituted one of the seven minor poisons of Sanskrit writers and had for

one of its synonyms '*garbhaghátini*,' or 'the drug that causes abortion,' but
e
d
y
English writers on Indian botany and materia medica speak of it as a violent poison, but none furnish satisfactory details of a case in which marked ill-effects were produced by its use It seems highly probable

MEDICINE. Root.

regarding its utilisation in Madras:—

rubbed up with cold water and then warming the part affected over the fire. This paste is applied also for parasitic affections of the skin"

The STARCH obtained from the root by washing is given internally in gonorrhœa

Starch. 245

ing . On the upper surface may be nt of origin of the stem, and on the under-surface beneath this another mark to which thin small
thin, loose,
our, and on
On cutting
The taste
nination by
r principle,
not identical

GLOSSOCARDIA, *Cass.; Gen. Pl., II., 384.*

247

Glossocardia linearifolia, *Cass.; Fl. Br. Ind., III., 308; Wight, Ic., t. 1110;* COMPOSITÆ.

Syn.—GLOSSOCARDIA BOSVALLIA, *DC.;* VERBESINA BOSVALLIA, *Linn. f.;* V. BOSWELLIA, *Roxb.;* PECTIS MEIFOLIA, *Wall.*

Vern.—*Seri,* HIND.; *Pithapra, phatursuva,* BOMB.; *Pitta-pápada,* POONA; *Páthara-suva,* MAR.; *Parapalanam,* TEL.; *Pithori,* SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 607; Dalz. & Gibs., Bomb. Fl., 129; Dymock, Mat. Med. W. Ind., 2nd. Ed., 433; Lisboa, U. Pl. Bomb., 200; Gazetteers:—Bomb., XV., 436; Mysore and Coorg, I., 56; N.-W. P., I., 82.*

Habitat.—A branched, glabrous annual herb; native of Rohilkhand, Banda, Central India, and the Deccan.

MEDICINE. 248

Medicine.—Dymock states that this plant is employed medicinally by the druggists of Poona, and Dalzell and Gibson mention that it is "much used in female complaints," the nature of which, however, they do not specify.

FOOD, Leaf. 249

Food.—Lisboa includes this in his list of Famine Plants, and writes, "The LEAF is said to be eaten in ordinary years as a vegetable, and is believed to be perfectly wholesome."

GLOSSOGYNE, *Cass.; Gen. Pl., II., 288.*

250

Glossogyne pinnatifida, *DC.; Fl. Br. Ind., III., 310;* COMPOSITÆ.

Syn.—BIDENS RIGIDA, *Hort. Calc.;* ZINNIA BIDENS, *Retz.;* BIDENS PINNATIFIDA, *Heyne.*

Vern.—*Barangom bir barangom,* SANTAL.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 604; Dalz. & Gibs., Bomb. Fl., 129; Rev. A. Campbell, Ec. Prod., Chutia Nagpur, Nos. 7541, 8424; N.-W. P. Gazetteer, I., 82; IV., lxxiii.*

Habitat.—A perennial, glabrous herb of the plains of India from Jammu and Garhwál to Western Bengal and Behar, and southwards to Madras.

MEDICINE, Root. 251

Medicine.—The Rev. A. Campbell states that a preparation from the ROOT is employed by the Santals as an application to snake-bite and scorpion-sting.

GLUTA, *Linn.; Gen. Pl., I., 421.*

252

Gluta elegans, *Wall.; Fl. Br. Ind., II., 22;* ANACARDIACEÆ.

Vern.—*Thayet-thitsé, khye,* BURM.

References.—*Kurz, For. Fl. Burm., I., 310; Prelim. For. Rep. on Pegu, App. A., xli.; Gazetteer, Burma, I., 136.*

Habitat.—A small evergreen tree found along the coast of Tenasserim.

DYE. Wood. 253

Dye.—Kurz mentions that the WOOD is used in Burma for dyeing, yielding, with different mordants, various shades of colour from orange to black. In the *Burma Gazetteer* the colours obtained are described as follows: "With—1, muriate of tin,—three shades of orange varying with the temperature of the bath and the time of immersion; 2, acetate of alumina,—two shades of flame colour; 3, acetate of iron,—two shades of drab; 4, acetate of iron, with a weak solution of galls,—a fine black of two shades."

TIMBER. 254

Structure of the Wood.—"Good for furniture, and when steeped in ferruginous mud turns jet black, looking like ebony. Used also for building purposes, boxes, &c." (*Kurz*).

255

G. tavoyana, *Wall.; Fl. Br. Ind., II., 22.*

Vern.—*Thayet-thitsé,* BURM.; *Ohay, thúmay,* KAREN.

References.—*Kurz, For. Fl. Burm., I., 309; Conference on Timbers, Col. & Ind. Exhib., July 26th, 1886, p. 2.*

Habitat.—A small evergreen tree of the coast of Tenasserim from Tavoy southwards.

Structure of the Wood.—Heart-wood bright-dark-red, close-grained, [illegible]

TIMBER. 256

Gluta travancorica, *Beddome, Fl. Br. Ind., II., 22.*

257

Vern.—*Shen kurani, shen curungi,* TINNEVELLY.

References.—*Beddome, Fl. Sylv., t. 60; Gamble, Man. Timb., 109; Indian Forester, III., 22, 23.*

[illegible] of t[illegible] S[illegible] red [illegible] stre[illegible]

TIMBER. 258

Gamble remarks, "This wood is little used, but its splendid colour and markings should bring it to notice as a valuable wood for furniture. It seems to season well, and works and polishes admirably."

Gluten of wheat; see Triticum sativum, *Lam.;* GRAMINEÆ.

GLYCERIA, *R. Br., Gen. Pl., III., 1197.*

Glyceria fluitans, *R. Br.; Duthie, Indigenous Fodder Grasses of the Plains of the N.-W. P., 41;* GRAMINEÆ.

259

MANNA GRASS.

[illegible]

FOOD and FODDER. [illegible]

a sort of porridge.

GLYCINE, *Linn.;* [illegible]

A genus of twining or sub-erect herbs, [illegible]

[illegible]

native of Japan and China, and reduce[illegible] hispida, *Mœnch,* Dolichos [illegible] enumerati[o]n of Chinese plants [illegible] these two forms as species [illegible] vated plant differs chiefly from [illegible] erect stem, and larger legumes. [illegible] of the Calcutta Herbarium [illegible] shown in the *Flora of British India* [illegible] went into the subject [illegible] India, any specimens of G. S[illegible] more hispid, and has large[r illegible]

GLYCINE hispida.

The Soy Bean.

G. hispida, *Maxim.*, quite as much as it does the Indian cultivated "G. Soja," which, indeed, it connects with G. hispida. It is, in fact, the plant most like the wild G. Soja, *S. et Z.*, which no one ever professes to have found wild in India, while it is also the one most like G. hispida, *Maxim.* (which has never been found wild anywhere). It is the plant collected by Dr. Watt and myself in the Naga hills."

The writer noted on his Naga hill specimens that they were found in a semi-wild state, and that the plant was known to the Angami Nagas as *Tsu Dza*, a name not unlike Soja. Throughout India, the Soy Bean is cultivated, black and white-seeded forms being met with, which vary to some extent, but all preserve the specific characters of G. hispida. Plants raised at Saharanpur from Japanese seed have larger and broader leaves than the usual Indian forms. The fact that this cultivated plant possesses, even among the aboriginal tribes, names which are original, *i.e.*, in no way modern derivatives, points to an ancient cultivation, if, indeed, it may not be accepted as an indication of its indigenous nature. (*Editor.*)

263

Glycine hispida, *Maxim.*; *Fl. Br. Ind.*, *II.*, *184*, under G. Soja, *Sieb. et Zucc.*; LEGUMINOSÆ.

THE SOY BEAN.

Syn.—DOLICHOS SOJA, *Linn.*; SOJA HISPIDA, *Mœnch*; S. ANGUSTIFOLIA, *Miq.*

Vern.—*Bhat, bhatwan, ram kurthi*, HIND.; *Bhut*, PUNJ.; *Gari-kulay*, BENG.; *Hendedisom horec*, (black-seeded), *Pond disom, horec* (white-seeded variety), SANTAL; *Tsu-dza*, NAGA.; *Bhatnas, bhatwas*, NEPAL; *Seta, kala botmas*, PARBAT.; *Musa, gya*, NEWAR; *Khajuwa*, EASTERN TERAI; *Bhu t*, KUMAUN.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 563; Stewart, Pb. Pl., 76; DC., Origin Cult. Pl., 330; Campbell, Ec. Prod., Chutia Nagpur, Nos. 8156, 8158; Atkinson, Him. Dist., 309, 696; Buchanan-Hamilton, Acct. of Nepal, 228; Church, Food Grains of India, 140; Spons' Encyclop., 1378, 1814; Smith, Dic., 386; Kew Reports, 1882, 42; Kew Off. Guide to the Mus. of Ec. Bot., 43; Trop. Agri., I., 567, IV., 695; Agri. Rep. Assam, 1882-83, No. 37; Special Reports, Director, Land Rev. and Agri., Bengal; Rep. of Proc. of Rev. and Agri. Dept., 1882, 2 to 12; 1883, 1 to 7.*

Habitat.—Extensively cultivated throughout India and in Eastern Bengal, Khásia hills, Manipur, the Naga hills, and Burma, often found as a weed on fields or near cultivation.

OIL. Seed. 264

Oil.—Large quantities of the SEED are annually used by the Chinese in the manufacture of an edible oil. "It is said that they obtain 17 per cent. of oil, by simple pressure. It bears a general resemblance to the ordinary edible oils of commerce, possessing an agreeable flavour and odour. It is useful for burning; exposed to a low temperature it becomes pasty, and oxidizes rapidly on exposure to the air. As a drying oil it might replace linseed for some purposes. As an illuminator it is being rapidly replaced by American petroleum, but is still extensively used for food. It is an important article of Chinese commerce" (*Spons' Encyclopædia, 1378*).

MEDICINE. Root. 265

Medicine.—A decoction of the ROOT is said to possess astringent properties.

FOOD and FODDER. 266

Food and Fodder.—The Soy-bean forms an important article of food in China and Japan. Since 1873, it has been successfully grown in the warmer parts of Europe. It is also widely spread, in a cultivated state, over a great part of the Himálaya and the plains and lower hills of India. On the plains the crop is generally grown by itself, as a *kharif* crop; the seeds are sown from June to September, and the harvesting takes place from November to January. Church gives the following information regarding the best methods of cultivation: "The seeds should be placed at a depth not

exceeding 1 to 1½ inch, 18 plants may be left after weeding to the square

FOOD and FODDER. Cultivation

this very important, vigorous, and productive pulse is not attacked by any insect or parasitic fungus" Two chief varieties of the cultivated Soy occur in India, one called "white," the other "black," but they are not distinguished by definite characters in chemical composition nor in properties

Area 267

Precise information cannot be given regarding the area under this crop in the various provinces of India Attempts have been made by Government to extend its cultivation in Assam, but apparently without success In 1882, Professor Kinch urged the advisability of renewed

in 1882.

Chemistry 268

CHEMISTRY.—The chemical composition of the bean, according to Professor Kinch, places it above all other pulses as an albuminous food, while that of "
lentils, and ev
Church: 'Ir
and sugar 26,
1 . 2, while the nutrient value is 105"

Bean 269

The BEAN is eaten in India in the localities where cultivated. The Rev. A. Campbell states that in Chutia Nagpur it is generally used roasted and ground as *satú*, or simply roasted in the form of [illegible]. In other parts of the country it is also eaten in the form of [illegible]. In China

chief item of the unenumerated [illegible] already mentioned, the OIL is extensively [illegible] article of food, and the cake left [illegible]

of flesh-forming materials [illegible] cattle food.

GLYCOSMIS, *Correa; Gen. Pl., I., 303.*

271

Glycosmis pentaphylla, *Correa; Fl. Br. Ind., I., 499;* RUTACEÆ.

Syn.—GLYCOSMIS CHYLOCARPA, *W. & A.;* G. ARBOREA, *DC.;* G. RETZII, *Roem.;* LIMONIA PENTAPHYLLA, *Retz;* L. ARBOREA, *Roxb.;* MYXOSPERMUM CHYLOCARPUM, *Roem.*

Vern.—*Ban nimbu, potali, pilrupotala, girgitti, ban nimbu,* HIND.; *Ashshoura,* BENG.; *Kirmira,* BOMB.; *Kirmira menki,* GOA; *Gonji pandu, golugu, konda golugu,* TEL.: *Gúroda,* KAN.; *Taushouk,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 364; Kurz, For. Fl. Burm., I., 185, 186; Beddome, Fl. Sylv. Anal. Gen., XLIII., t. 6, 66; Bedd. in Trans. Linn. Soc., XXV., 211; Gamble, Man. Timb., 59; Thwaites, En. Ceylon Pl., 45, 406; Dalz. & Gibs., Bomb. Fl., 29; Elliot, Fl. Andhr., 61, 95; Atkinson, Him. Dist., 307; Lisboa, U. Pl. Bomb., 149, 274; Atkinson, Ec. Prod. of N.-W. P., Pt. V., 49; Indian Forester, X., 315, 325; XIV., 390; Gazetteers:—Mysore and Coorg, I., 69; N.-W. P., IV., lxix; Bomb., XV., Pt. I., 429.*

Habitat.—A common evergreen shrub throughout the Tropical and Sub-tropical Himálaya, ascending to 7,000 feet in Sikkim. It extends from the Sutlej river in the North-West, eastwards and southwards to Upper Assam, Burma, Travancore, Malacca, and Ceylon.

MEDICINE. Roots. 272 — Wood. 273

Medicine.—Mr. T. N. Mukharji states that the ROOTS pounded and mixed with sugar are given in cases of low fever by Native practitioners. Lisboa mentions that the WOOD bruised with water is administered internally as an antidote for snake-bite.

FOOD. Fruit. 274

Food.—The FRUIT, a white berry, about the size of a large pea, is commonly eaten.

TIMBER. 275

Structure of the Wood.—White, hard, close-grained.

DOMESTIC. Twigs. 276 — Leafy twigs. 277

Domestic Uses.—TWIGS used by the Bengalis to clean the teeth. The LEAFY TWIGS are in some of the rural parts of Bengal stuck into the walls and roofs of huts about the beginning of April to ward off lightning (see also **Euphorbia antiquorum**, p. 295).

GLYCYRRHIZA, *Linn.; Gen. Pl., I., 508.*

278

Glycyrrhiza glabra, *Boiss.; Fl. Or., II., 202; Linn.;* LEGUMINOSÆ.

LIQUORICE ROOT.

Vern.—*Mulhatti, jethi-madh,* extract=*jathimadh-ká-ras, mulatthi-ká-ras,* HIND.; *Jashtimadhu, jai-shbomodhu,* BENG.; *Muraiti-ka-jur,* BEHAR; *Mulethi,* N.-W. P.; *Mitthi-lakri,* DEC.; Bazar root=*aslasús, jetimadh, muleti,* extract=*rabésús,* PB.; *Zaisí, makh, sús,* AFG.; *Jashti madhu,* BOMB; *Jéshtá madha,* MAR.; *Jethi madha,* GUZ.; *Anti-ma-duram, ati-maduram,* extract=*ati-maduram-pál,* TAM.; [illegible] *madhuramu,* extract=*yashti-maduram-pálu,* TE[illegible] *ati-madhurá,* KAN.; *Yashti-madhukam, ati mad*[illegible] *ram,* MALAY.; *Noe-khiyu, noe-khiyu-asui,* BURM; *Ati-maduram, velmi,* SING.; *Madhuka, yashti madhu, madhu-yashtikam,* SANS.; *Aslussús,* extract=*rubbussús,* ARAB.; *Bikhe-mahak,* extract=*asus, rob-a-sus, ausárahe-mahak,* PERS.

References.—*Stewart, Pb. Pl., 69; Aitchison, Botany of Afgh. Del. Comm., 56; Mason's Burma and Its People, 502; Pharm. Ind., 75; Ainslie, Mat. Ind., I., 199; O'Shaughnessy, Beng. Dispens., 293; Moodeen Sheriff, Supp. Pharm. Ind., 148; U. C. Dutt, Mat. Med. Hind., 143, 324; Dymock, Mat. Med. W. Ind., 2nd Ed., 244; Fleming, Med. Pl. and Drugs, as in As. Res., Vol. XI., I., 168; Flück. & Hanb., Pharmacog., 179; Bent. & Trim., Med. Pl., 74; S. Arjun, Bomb. Drugs, 41; Murray, Pl. and Drugs, Sind, 117; Med. Top. Ajmir, 146; Irvine, Mat. Med. Patna, 64; Baden Powell, Pb. Pr., 340; Birdwood, Bomb. Pr., 29; Buck, Dyes and Tans, N.-W. P., 44; Liotard, Dyes, 136; Smith, Dic., 247; Kew Off. Guide to the Mus. of Ec. Bot., 41; Report on the Settlement of the Hardoi District, Oude, 15; Indian Forester, XIII., 93.*

Habitat.—A perennial herb, of South Europe, Asia Minor, Armenia, Siberia, Persia, Turkistan, and Afghánistan It is cultivated in Italy, France, Russia, Germany, Spain, and China, also to a small extent in England. Though neither wild nor cultivated in India it is an import of some consequence, and has been employed for medicine and in dyeing for many years The root used in medicine is principally derived from two varieties, namely —α typica, and γ glandulifera (*Boissier*).

Dye—The WOOD, imported through the Panjáb from Afghánistan, is, in the North-West Provinces, employed in calico-printing, to perfume the fabric and give it a finish (*Sir E C Buck*)

DYE Wood. 279

Medicine.—Liquorice ROOT has been used in Hindú medicine from a very remote period U C Dutt states that "it is mentioned by Susruta,

MEDICINE. Root 280

He says that the Egyptian is the best, next that of Irak, and then Syrian ... ve, re- liuretic bron- olic, it is also dropped into the eyes to strengthen the sight A poultice made of the LEAVES is said to be a cure for scald-head and stinking of the feet or arm-pits. Muhammad bin Ahmad, and Yohanna bin Serapion recommend the SEEDS as being the most active part of the plant, but remark that they are only produced in certain climates (*eg*, Basra)" In Europe also the medicinal value of Liquorice has long been known It is unquestionably alluded to by Theophrastus, and by Dioscorides, who calls the plant γλυκιῤῥίζη; also by several Roman writers (Ceerus, Scribonius, Largus, and others), who describe it under the name of

Leaves 281

Seeds 282

Chemical Composition 283

Action and Uses 284

MEDICINE.

medicine, chiefly used for pharmaceutical purposes. It disguises the taste of many nauseous drugs, particularly senna, aloes, chloride of ammonium, senega, hyoscyamus, turpentine, and bitter sulphates, and is also, when powdered, a useful basis for pills. It has a pleasant taste, and, when slowly chewed or sucked, increases the flow of saliva and mucus. It is also a popular demulcent, and is largely employed to relieve sore-throats and coughs. It is used by Native practitioners as a demulcent in catarrh of the genito-urinary passages, and as a slight laxative.

TIMBER. 285

Structure of the Wood.—Bright yellow, tough and fibrous. Dymock writes: "In Persia glass bottle-makers use the wood for melting their materials, as they say it gives a greater heat than any other kind of fuel."

TRADE. 286

Trade.—The chief supply of the root in India is obtained from the Persian Gulf and Karáchi, and of the wood, for dyeing, from Afghánistan, *viá* the Panjáb. Dymock states that the kind known as Karáchi liquorice is the best, and fetches from R50 to 80 per kandy of 5 cwt. Ordinary Persian liquorice is smaller, and not so sweet.

GMELINA, *Linn.; Gen. Pl., II., 1153.*

A genus of trees or shrubs belonging to the Natural Order VERBENACEÆ, and comprising eight species, of which five are natives of India.

287

Gmelina arborea, *Linn.; Fl. Br. Ind., IV., 581; Wight, Ic., t. 1470;* [VERBENACEÆ,

Syn.—GMELINA RHEEDII, *Hook.;* PREMNA ARBOREA, *Roth.;* P. TOMENTOSA, *Miq.*

Vern.—*Kumbhár, gumbhár, gamhar, gámbhár, khammara, kambhar, kúmár, gambari, sewan, shewan, gamári, khambhári,* HIND.; *Gamari, gúmár, gúmbar,* BENG.; *Gambari,* URIYA; *Gumher, kasamar,* KOL.; *Kasmár,* SANTAL; *Gomari,* ASSAM; *Gambari,* NEPAL; *Numbon,* LEPCHA; *Gumai,* CACHAR; *Bolko bak,* GARO; *Kurse,* GOND; *Kúmhár, Gúmhár,* Bazár fruit=*kákódúmbári,* PB.; *Sewan,* HAZARA; *Kassamar,* KURKU; *Gúmbhar, shiwun,* C. P.; *Shewun,* BOMB.; *Shewan, shivan,* MAR.; *Chimman, sag,* BHIL; *Gumudu téku, teggummadu, kasmaryamu, gumadi, cummi,* TAM.; *Gúmar-tek, pedda gomru, tagumúda, gumudu, pedda gumudu téku, gumudu téku,* TEL.; *Kasmiri, kuli, shewney, shivani,* KAN.; *Kumbulu,* MALAY.; *Ramani,* MAGH.; *Yumanai, yémené, kyúnboc, kywon-pho,* BURM.; *At-demmata,* SING.; *Gumb'iarí, sripnari, Kásmari,* SANS.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 486; Brandis, For. Fl., 364; Kurz, For. Fl. Burm., II., 264; Beddome, Fl. Sylv., t. 253; Gamble, Man. Timb., 295; Thwaites, En. Ceylon Pl., 244; Dalz. & Gibs., Bomb. Fl., 201; Stewart, Pb. Pl., 166; Elliot, Fl. Andhr., 65, 88, 148, 174; Mason, Burma and Its People, 526, 793; Rev. A. Campbell, Ec. Prod., Chutia Nagpur, No. 9245; O'Shaughnessy, Beng. Dispens., 486; U. C. Dutt, Mat. Med. Hind., 218, 297, 304; Dymock, Mat. Med. W. Ind., 2nd Ed., 599; S. Arjun, Bomb. Drugs, 105; Baden Powell, Pb. Pr., 365, 581; Atkinson, Him. Dist., 315, 738; Drury, U. Pl., 228; Lisboa, U. Pl. Bomb., 107, 168; Birdwood, Bomb. Pr., 334; Balfour, Cyclop., I., 213; Treasury of Bot., I., 538; Aplin, Rep. on Shan States, 1887-88; For. Adm. Rep., Chutia Nagpur, 1885, 6, 33; Buchanan, Statistics of Dinajpur, 151; Agri-Hort. Soc. of India, Journals (Old Series), VI., 26; VIII., Sel., 177; IX., 252, Sel., 44; XIII., 307; (New Series), VII., 276; Indian Forester, II., 19, 23; V., 190; VI., 101; VIII., 127, 128, 414, 438; IX., 238, 359, 607; X., 222, 325; XI., 354; XII., App. 19; XIII., 121; Gazetteers:—Mysore and Coorg, I., 48; Rajputana, 25; N.-W. P., IV., lxxvi; Bombay, VI., 14; VII., 32, 36; XIII., 27; XV., 70; XVII., 26; XVIII., 52; Orissa, II., 179, App. VI.; Settlement Reports:—Central Provs.;—Raipore District, 75; Chanda, App. VI.; Manual of the Coimbatore District (Madras), 407.*

Habitat.—A large deciduous tree, sometimes attaining the height of 60 feet, met with in the Sub-Himálayan tract from the Chenab eastwards, also throughout India, Burma, and the Andaman Islands. Mr. C. B. Clarke,

in the *Flora of British India*, describes a variety—glaucescens,—which
th, often
-tropical

d FRUIT
are employed as dyes by the Santals. This fact is of interest, as the writer can find no reference to their being similarly utilised in other parts of India.

DYE Wood-Ashes 288 Fruit 289

Medicine.—The ROOT has long been an article of medicine with the Hindus. It is described as bitter, tonic, stomachic, laxative, and useful in fever, indigestion, anasarca, and various other complaints. U. C. Dutt writes: "It is an ingredient of *dasamula*" (a compound decoction of ten plants,—Desmodium gangeticum, Tribulus terrestris, and others) "and is

MEDICINE. Root 290

Fruit. 291 Bark 292 Leaves 293

employed medicinally, and, in Northern India, the former is believed to have anthelmintic properties.

Food and Fodder.—This species flowers in the beginning of the hot season, and produces a FRUIT in April and May which is eaten by the Gonds and other hill tribes. The LEAVES are used as fodder, and are also much browsed by deer and other wild animals.

FOOD Fruit 294 FODDER Leaves 295

Structure of the Wood.—Yellowish grey ish or reddish-white, with a glossy lustre, close and even-grained, soft, strong; does not warp or crack in seasoning, weight from 28 to 35lb per cubic foot, breaking weight of a bar, 6 feet × 2 inch × 2 inch, 580lb (according to Baker). It is light, has a good surface, is very durable, is easily worked, and takes paint and varnish readily, and is, therefore, highly esteemed for planking furniture, carriages, boat-decks, panelling and ornamental work

TIMBER 296

though much smaller, made of teak, were so much decayed a year ago, as

to render it necessary to replace them." Since the date of the publication of the above experiments, the wood has come permanently into notice and is in considerable demand in Calcutta for furniture-making.

INDUSTRIAL USE. 297

Industrial Use.—The tree has been recommended as a good one on which to rear silkworms (*Agri.-Hort. Soc. of India Journ.*, VII. (*New Series*), 276).

298

Gmelina asiatica, *Linn.; Fl. Br. Ind., IV., 582; Wight, Ic., t. 174.*

Syn.—GMELINA COROMANDELIANA, *Burm.*; G. LOBATA, *Gaertn.*; *Fruct., I., 268, t. 56, excl. syn. Rumph.*; G. PARVIFOLIA, *Roxb.*; G. PARVIFLORA, *Roxb.*; C. INERMIS, *Blanco*; MICHELIA SPINOSA, *Amman.*

Vern.—*Badhára*, HIND.; *Bhedaira*, BEHAR; *Badhára*, PB.; *Láhán shivan*, MAR.; *Nilak-kumizh*, TAM.; *Gamudu, gumudu, challa-gumudu, kavva-gumudu*, TEL.; *Láhán shivan, kal-shivani*, KAN.; *Nilak-kumazh*, MALAY.; *Gatta-demmatta*, SING.; *Biddari*, SANS.

References.—*Roxb., Fl., Ind., Ed. C.B.C., 487; Brandis, For. Fl., 365; Kurz, For. Fl. Burm., II., 265; Beddome, For. Man., 172; Elliot, Flora Andhrica, 33, 65, 89; Pharm. Ind., 164; Ainslie, Mat. Ind., II., 240, 386; O'Shaughnessy, Beng. Dispens., 486; Dymock, Mat. Med. W. Ind., 2nd Ed., 599; S. Arjun, Bomb. Drugs, 199; Irvine, Mat. Med. Patna, 124; Baden Powell, Pb. Pr., 364; Drury, U. Pl., 229; Balfour, Cyclop., I., 1214; Treasury of Bot., I., 538; Official Corresp. on proposed new Pharm. Ind., 240-1; Gazetteers:—Mysore and Coorg, I., 64; Bombay, XV., 70; N.-W. P., Vol. I., 83; IV., lxxvi.*

Habitat.—A large much-branching shrub of the forests of South India, Burma, and Ceylon; cultivated in Bengal.

MEDICINE. Root 299

Medicine.—The ROOT has been used as a demulcent by Hindú physicians from remote times. Rumphius mentions it under the name of "*jambusa sylvestris parviflora*;" Louriero speaks of its virtues in his *Flora of Cochin China*, commending it as of value in rheumatism and affections of the nerves; Dr. Horsfield in his Account of the Medicinal Plants of Java states that the plant was formerly in high esteem amongst the Portuguese, who called it *Rais Madre de Deos*. Ainslie also notices the plant, writing: "The root which, as it appears in the bazárs, is mucilaginous and demulcent, the Vytians reckon amongst those medicines which purify the blood, in cases of depraved habit of body; given in the form of electuary, to the quantity of a tea-spoonful twice daily." In another passage he describes the virtues of the LEAVES as follows: "Its leaves would appear to have the quality of thickening water, and rendering it mucilaginous when agitated in it, so becoming a useful drink in gonorrhœa, and other maladies requiring demúlcents. Certain other leaves have the same property, with this difference, that when our article is gently stirred in water, and the leaves at the same time a little bruised, the thickening of the water, by this means produced, does not pass away, as in the other instances, but remains; so it must be considered as a much more valuable medicine." Roxburgh and O'Shaughnessy comment on the same property of the leaves, and their observations are republished in the *Pharmacopœia of India*, which includes the drug in its non-officinal list. At the present time the root is principally employed as a demulcent for gonorrhœa and catarrh of the bladder, in doses of ʒii to ʒii in infusion, but it is also supposed to possess specific properties in the treatment of rheumatism and syphilis.

Leaves. 300

SPECIAL OPINIONS.—§ "Laxative and alterative. Useful in chronic rheumatism." (*Surgeon-Major J. McD. Houston, Travancore, and John Gomes, Esq., Medical Store-keeper, Trivandrum.*) "Useful in chronic rheumatism." (*Surgeon-Major J. J. L. Ratton, M.D., Medical College, Madras.*)

DOMESTICS.

Domestic.—The Telegu names above given are said by Elliot to be

derived from the fact that churning-sticks are made from the SHRUB — *Challa* means butter-milk, and *Kavammu*, a churning-stick

DOMESTIC. Shrub 301

GNAPHALIUM, *Linn*, *Gen Pl*, *II*, *305*

Gnaphalium luteo album, *Linn*, *Fl Br. Ind*, *III*, *288*, [COMPOSITÆ

302

Syn.—GNAPHALIUM ORIXENSE, *and* G ALBO LUTEUM, *Roxb*, SYNANTHERA, *Wall*, *Cat*, *7415*

Var. 1.—MULTICEPS, heads golden yellow, G MULTICEPS, *Wall* G RAMIGERUM and CONFUSUM, *DC*, G AFFINE, *Don*, G MARTABANICUM, *Wall*

Var. 2 —PALLIDUM heads pale brown, G PALLIDUM, *Ham*

Vern —*Bál raksha*, PB, *Byaing che piu*, BURM

References —*Roxb Fl Ind*, *Ed C B C*, *600, 601 Kurz, Prelim For Rep on Pegu App C*, *xii*, *Stewart, Pb Pl*, *127 Gazetteer, N W P IV.*, *lxxiii*

Habitat.—A very variable annual, common throughout India, from Kashmír to Burma and southwards to Martaban, ascending to 10,000

Medicine —Stewart states that the LEAVES are sold as a medicine in the bazárs of the Panjáb, and quotes Madden to the effect that another unknown species is employed for tinder and moxas, in the region of the Sutlej

MEDICINE Leaves 303 Tinder. 304

Domestic —In Assam and the Naga Hills the leaves are rubbed in the hand to crumble away the cellular tissue, leaving behind the tomentum This constitutes the tinder universally used on the eastern side of India

DOMESTIC 305

GNEISS, *Ball*, *Geology of India*, *III*, *534*

306

The following note has been kindly furnished by Mr H Medlicott, late Director of the Geological Survey

Gneiss, *Eng*

GNEISS GRANITE, *Fr*, GNEISS, HOLZ GNEISS, GRANIT, *Ger*, GRANITO *It.*

[illegible]

[illegible] 1,400

circular area of gneiss In the north-west quarter of Peninsular India, in the Arvali region, another area of gneiss occurs In the Lower Himálayas, gneiss occurs over a considerable area in Sikkim in the neighbourhood of Darjiling, and more or less throughout the whole range to the Sutlej

In the Himálayan Range proper, gneiss is the predominant rock for 300 miles to the west of Nepál, many of the highest peaks being formed of it In Ladák a range of syenitic gneiss separates the Indus from its tributary the Shaiok and the Pang kong lake, and passes to the south east on both sides of the Indus through Rupshu into Chinese Thibet The Zánskár range in its central portion, and the Pir Panjál chain, consist

Building Stones. 307

GNEISS.

to a great extent of this rock. Another gneissic ridge is the Dhauladhar range, extending north of the Kangra Valley in a north-west direction as far as Dalhousie.

In Burma the gneissic series consists to some extent of granitoid and hornblendic gneiss. Little attention has hitherto been paid to the metamorphic rocks of Burma; they occupy a large but unexplored area in Upper Burma; they form all the higher ranges in the neighbourhood of Ava and extend throughout a great portion of the country, extending thence to Salwin. Further north, they reach from Bhamo to the neighbourhood of Momein in Yunnan; the crystalline rocks then continue to the south, forming the Red Karen country and the hills between Sittang and Salwin, and extend into Tenasserim.

In the Nilghiri hills there are several places where excellent building stones could be obtained, but hitherto not much use has been made of them. In Mysore a variety is obtained which can be split into posts 20 feet long, which are used as supports for the telegraph wires. In the construction of walls, "bunds" of tanks, the beach groynes at Tranquebar, culverts, temples, bridges, &c., blocks of gneiss have been used. In Madras, beds of hornblendic gneiss are largely quarried at Palaveram, Cuddapary Choultry, and Pattandalum for the manufacture of articles of domestic use as well as for building purposes. In the Nellore-Kristna district it is used in the manufacture of cart-wheels.

Except for purely local purposes, the construction of bridges, &c. where the rock nearest at hand has, upon economical grounds, been made use of, this material has not commended itself for building purposes to English engineers. It is, however, peculiarly susceptible to fine carving and, with the exception of some of the trap rocks, was the favourite stone for almost all the great temples in Southern India.

See publications of the Geological Survey of India and Journals of the Asiatic Societies of Bengal and Madras.

GNETUM, *Linn.; Gen. Pl., III., 419.*

308

Gnetum Gnemon, *Linn.; Fl. Br. Ind., V., 641;* GNETACEÆ.

Syn.—GNETUM BRUNONIANUM, *Griff.;* G. GRIFFITHII, *Parlat.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 632; Kurz, For. Fl. Burm., II., 497; in Flora, lv. (1872), 350; Gamble, Man. Timb., 293.*

Habitat.—An evergreen shrub or small tree of the Khásia and Manipur Hills, extending southwards to Singapur, frequent in the dense forests of Southern Tenasserim.

FIBRE. Bark. 309

Fibre.—"The BARK is made into strong cords at Sumatra" (*Roxburgh*).

FOOD. Leaves. 310

Food.—"The LEAVES are eaten as spinach" (*Roxburgh*).

311

G. scandens, *Roxb.; Fl. Br. Ind., V., 642; Griff. in Trans. Linn Soc., XXII., t. 55; f. 1-8, 22, 23, and t. 56, f. 39, 40, 42.*

Syn.—GNETUM EDULE, *Blume;* G. FUNICULARE, *Wight, Ic., t.* 1955 (not of *Blume*); G. PYRIFOLIUM, *Miq.;* THOA EDULIS, *Willd.*

Vern.—*Nanu-witi,* SYLHET; *Kúmbal, umble, úmbli,* BOMB.; *Umbrút ballé,* KAN.; *Ula,* MALAY.; *Gyútnwé,* BURM.; *Pilita,* ANDAM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 632; Brandis, For. Fl., 502; Kurz, For. Fl. Burm., II., 495, in Flora, lv. (1872), 350; Gamble, Man. Timb., 393; Rheede, Hort. Malab., VII., t. 22; Grah. Cat. Bomb. Pl., 188; Dalz. & Gibs., Bomb. Fl., 246; Lisboa, U. Pl. Bomb., 174, 273; Agri.-Hort. Soc. of India, Journal, IV., (Old Series), Sel., 264; Bombay Gazetteer, XV., 444.*

Habitat.—A lofty diœcious climbing shrub, met with in the Tropical Himálaya from Sikkim eastwards, to Assam, Singapore, and the Anda-

man Islands, also in the hills of the Deccan from the Konkan to the Nilghiris

Fibre —The STEMS yield a fibre which is employed by the natives of the Andaman Islands for the manufacture of hard fishing nets called *Kud*

FIBRE. Stems 312

Food —The SHRUB, which flowers in March and April, yields an edible fruit in September and October It is rather larger than the largest olive, and, when ripe, is smooth and orange coloured The outer succulent coat or PULP is commonly eaten by the Natives, and the SEEDS, when roasted, are also employed as an article of food

FOOD Shrub 313 Pulp 314 Seeds 315

Structure of the Wood —Dark-brown soft, coarsely fibrous, porous, rather heavy, but of no use except possibly for rough cordage (*Kurz*)

TIMBER 316

Goa Bean; see **Psophocarpus tetragonolobus, DC, LEGUMINOSÆ**

Goats; see **Sheep & Goats.**

GOLD.

Gold, *Ball, Geology of India, III, 173-230 608 610*

317

The colour, lustre, power of resisting oxidation, extreme ductility and malleability of this metal have caused it to be much valued from the

abundant evidence exists of the knowledge of gold in India from very remote times Pliny in A D 77 referred to the country of the Nareae as containing numerous mines of gold and silver, and that by the Nareae were meant the Nairs of Malabar is now an established fact Ancient inscriptions shew that in the eleventh century gold existed at least in Southern India in great abundance, and numerous and extensive, very

the same date, it is stated that ' although gold is imported into Hindustán it is to be found in abundance in the northern mountains of the country, as also in Tibet Gold may be obtained by the *Saloni* process" (washing) "from the sands of the Ganges, Indus, and several other rivers, as most of the waters of this country are mixed with gold

amount of success, and may develop into an industry of some importance It may, accordingly, be of interest to give a short resumé of the facts regarding the occurrence and supply of gold in India at the present day.

Vern —*Sona*, HIND, *Gser*, TIBET; *Sona, swarna*, MAR, *Paon ponnu* TAM, *Bungarum bungaru*, TEL, *Mas amas, kanchana*, MALAY, *Shwae*, BURM *Rin* SING, *Suvarna, swarna*, SANS, *Tibr, zahab*, ARAB, *Tilla, thil, zir*, PERS

GOLD.

Gold.

References.—*Mallet, Geology of India (Mineralogy), IV., 1; Ainslie, Mat. Ind., I., 514-522; U. C. Dutt, Mat. Med. Hind., 57; Irvine, Med. Top. Ajmir, 169; Linschoten, Voyage to the East Indies, I., 27, 31, 109; II., 295; Abul Fazl, Ain-i-Akbari (Blochmann's Trans.), 17-30, 36-43; (Gladwin's Translation), II., 136; Buchanan, Journey through Mysore, &c., I., 441; Baden Powell, Pb. Pr., 12; Atkinson, Econ. Geol. of N.-W. P., 276; Mason, Burma and Its People, 560, 729; Oldham, Mission to Ava, 344; Forbes Watson Industrial Survey, II., 405; W. W. Hunter, Statistical Acct. of Bengal, II., 27, 75, App. 1; III., 39, 149; XIII., 228; XVII., 23, 167, 190, 202, 259; XIX., 203; Statistical Acct. of Assam, I., 106, 380; Balfour, Cyclop., I., 1220; Indian Agriculturist, Oct. 22nd, 1887; March 22nd, April 16th, July 13th, Nov. 9th and 11th, 1889; Bosworth-Smith, Rep. on the Kolar Gold Field, 1889; Proceedings of the Rev. & Agri. Dept. for March 1880, 19 and 20A; Brough Smith, Report on Wynaad, 1880; Bruce Foote, Auriferous Rock series in South India, Rec., G. S. I.; Gazetteers:—Mysore and Coorg, I., 17, 34, 432; Bhandara, Central Provs., 59; Bombay, V., 123; VII., 40; VIII., 261; Panjáb, Delhi, 133; Ambala, 11; Gurgaon, 14; Jhelam, 825; Rawal Pindi, 12; Bannu, 22; Peshawar, 24; Madras, Man. of Admin., II., App. VI., 33, 34; Admin. Rept., Central Provs., 124; Bombay, 1871-72, 373, 384; Settlement Reports:—Central Provs., Nagpur, Sup., 276; Seoni, 11; Upper Godavery Dist., 42; Chanda, 105; Panjáb, Hazara, 9; Peshawar, 12; Kohat, 32. Consult also the works quoted by Ball, Econ. Geology, pp. 608-611.*

OCCURRENCE 318

Occurrence.—The following account of the localities in which gold is chiefly to be found in India is abridged, for the most part, from the exhaustive article on the subject in *Ball's Economic Geology,* to which the reader is referred for more detailed information.

The ultimate derivation of most of the gold of Peninsular India is doubtless from the quartz reefs which occur traversing the metamorphic and sub-metamorphic series of rocks, but a certain quantity appears to exist in certain chlorotic schists and quartzites, and possibly also in some forms of gneiss. Existing evidence regarding the relative productiveness of the reefs in the different groups or series of metamorphosed rocks is conflicting, probably owing to the fact that a rule which holds good in one part of the country does not necessarily apply to other areas. The presence of gold has not yet been proved in any member of the Vindhyan formation, but in the next succeeding formation several of the groups included in the Gondwana system are believed to contain detrital gold. It is almost certain, also, that the gold obtained in the Godavari and in its tributary near Godalore, or Mungapet, is derived from rocks of Kamthi age, and the gold of the Ouli river in Talchir (Orissa) is derived from sandstones. The only other sources in Peninsular India are the recent and sub-recent alluvial deposits which rest on the metamorphic and sub-metamorphic rocks.

Passing to the extra-peninsular regions, gold is met with in rocks of several different periods. In Ladak it occurs in quartz reefs which traverse carboniferous rocks, in Kandahar it is found in cretaceous formations, as an original deposit connected with the intrusion of trap; while all along the foot of the Himálaya, the tertiary rocks which flank the bases of the hills are more or less auriferous. But the gold occurring in the last-mentioned area is all detrital, and is doubtless derived from the crystalline metamorphic rocks of the higher ranges which are, from other reasons, known to contain gold.

MADRAS. 319

I. MADRAS was in remote times famous for its gold mines, and has in recent years attracted much public attention and a large amount of capital in the endeavours that have been made to again open up a long dormant industry. Gold is known to exist in Travancore, Madura, Salem, Malabar, Wynaad, Mysore, and Bellary; but according to Ball its occurrence in Vizagapatam is as yet unproved.

Gold. (*J. Murray*)	GOLD.

MADRAS. Travancore. 320

In Travancore, it is found in outcrops of beds of quartzite including felspar, which run with the gneiss, but no real quartz reefs occur. Dr. W. King in a report to the Travancore Government (1881) stated that in only one c
of stone.
Nelson, in
Veiger rive
in some p
gold-wash

Madura. 321

Salem. 322

Malabar. 323

Dr Buchanan
istence of gold-
ad the exclusive
ge. Ainslie in-
river at Calicut
ated before the
batore and the
country west and south of the Nilghiri and Kunda hills, 2,000 square miles of soil were auriferous, and that at that time the Government derived a revenue from assessing the *puttis* or trays used to wash the gold. In 1831 the Collector of Malabar furnished a report to Government on the localities in which gold was then to be found, and in the same year Lieutenant Nicholson was appointed to prospect the gold-fields, and

for a quarter of a century, at the end of which time, in 1857-58, letters from the Collector of Malabar again attracted attention to the subject. In 1865 two Englishmen with experience of Australian gold-mining were attracted to the district, and soon afterwards machinery was erected to

rage of 1 ounce 8 dwt. 22 grains per ton. Mr. Brough Smith deals fully with such important subjects as climate, water, and timber-supply,

GOLD.

Gold.

MADRAS.

&c., and, in his concluding remark, speaks with confidence as to the future of the industry, maintaining that failure can only result from want of care and forethought.

Professor Ball concludes his interesting account of the gold in this region, by giving an estimate of the cost of working a company on the authority of Mr. Ryan. As this is stated to be based on actual experience, it may prove both useful and interesting, and may be here quoted: "It being assumed that a concession of value cannot now be obtained at a less cost than £60,000, the following would represent the first year's expenditure:—

	£
Price paid for concession	60,000
Cost of machinery, 100 stamp-heads at £200 each .	20,000
One year's working expenses	12,000
Contingencies, law-expenses, &c.	8,000

Taking the value of gold at £3-15 per ounce, the return from 25,000 tons of stone, containing from 3 to 10 dwt. of gold per ton would be as follows:—

	Total ounces.	Value at £3-15.	Cost of production.*	Profit.	Percentage on capital of £100,000.
		£	£	£	£
3 dwt. per ton . .	3,750	14,062	11,875	2,187	2·19
4 ,, ,, ,, . .	5,000	18,750	11,875	6,875	6·87
5 ,, ,, ,, . .	6,250	23,437	11,875	11,562	11·56
6 ,, ,, ,, . .	7,500	28,135	11,875	16,250	16·25
7 ,, ,, ,, . .	8,750	38,812	11,875	20,937	20·93
8 ,, ,, ,, . .	10,000	37,500	11,875	25,625	25·62
9 ,, ,, ,, . .	11,250	42,187	11,875	30,312	30·31
10 ,, ,, ,, . .	12,250	46,875	11,875	35,000	35·00

MYSORE.
324

II. MYSORE PROVINCE.—Captain Warren, in 1802, hearing of a rumour that gold had been found at the Yerra Baterine Hill, instituted enquiries which elicited the fact that there were gold-washings near the village of Wurigam (the modern Urigam or Ooregaum), and actual mining at Marcurpam. He proved the presence of gold in the surface soil and beds of the rivers over an extended area in the neighbourhood of the Manigatta, Wullur, and Yeldur hills, from Budikote to Ramasamudra. The people who washed were Dherus or Pariahs, and he appears to have thought that agriculture was for them a more profitable profession. He then described two mines, one at Kembly, 30 feet deep, having a gallery of 50 feet; the other west of Surunpally, which was 45 feet deep and 56 feet in extent. From the sections given, Ball remarks "it is evident that these were not in solid rock, but that masses of quartz in an ochreous matrix had been taken out to be crushed." Later, Heyne alludes to Warren's researches, and various officers appear to have collected samples from the same region at subsequent dates. General Sir Mark Cubbon, when Commissioner of Mysore, is said to have prohibited more mines being sunk, in consequence of the frequency of accidents in those already existing. Subsequent to this date little attention appears to have been paid to the subject for nearly fifty years.

Of late years, however, the gold industry in this province has received a marked impetus, and its gradual growth can be traced through succes-

* This sum is arrived at as the average of several estimates of cost, 25,000 tons at 9*s*. 6*d*.=£11,875.

MYSORE

quantities in certain districts, and permission was granted to a Mr Lavelle to prospect for gold and other metals during a period of three years He was informed that leases for a period of twenty years would be granted to him, of not more than ten blocks, each of two square miles

Kolar gold-field has a future before it But that the expectations that were first started when gold-mining in India was revived in 1880 will ever be realised in this (or any other gold field in any part of the globe) is very doubtful Some of the mines are now paying expenses, and there can be no doubt that, managed economically and under scientific supervision, several others should easily pay their way at an early date If regular divi-

has
ting
new
take
do n

buted to the *Records of the Geological Survey of India*, has also taken a more favourable view of the subject In one passage he writes, "the great success attained at a good number of the mines now being worked there has proved beyond all cavil, that gold does exist in richly paying quantity in many of the lodes running through the Dharwar schists" (the Kolar Gold-

MYSORE.

Field Band), "and I for one firmly believe that lodes of equal richness will be found in other tracts in which similar geological conditions prevail." In another passage he writes, "the results already obtained at Kolar are abundantly good enough to encourage sensible people to proceed with care and forethought to open other mines." In his opinion the gold-mining operations at present conducted, have only to a very small extent tapped the gold-bearing rocks of Mysore. Over the whole extent of the province from north to south, run well-marked bands of Dharwar schists, which all bear evidence of having been worked to a greater or lesser extent by Natives in remote times. The Kolar band does not belong to these well-marked great bands of Dharwar, but is an outlier of limited extent. Of the great bands traversing Mysore, the western is said by Mr. Foote to be the largest and least known, being covered by the dense forests and steep hills of the Western Ghâts.

HYDERABAD. 325

III. HYDERABAD.—Gold-dust is found in the bed of the Godavari and its tributaries, and appears to have been fairly extensively worked up to the end of last century; at that time, however, operations ceased owing to an excessive rent charged by the Raja. According to Dr. Walker there was a gold mine about 1790 near the village of Goodloor or Godalore, in the vicinity of Mungapet, but Ball points out that, owing to the absence of crystalline rocks in the neighbourhood, it is improbable that there ever was a real mine there.

BENGAL. 326

IV. BENGAL.—Gold is obtained in Orissa, Midnapur, Bankura, and in the Province of Chutia Nagpur, the last-mentioned locality being apparently specially rich in the metal.

Orissa. 327

Orissa.—Ball states that "within the limits of the Province of Orissa gold-washing is or has been carried out in the Native States of Dhenkanal, Keonjhar, Pal Lahara, and Talchir. It is a poor pursuit, as in so many other parts of the country, but the fact is interesting as affording evidence of the existence of gold." At the present time gold-washing is carried on most actively in the Brahmini river, where it traverses Pal Lahara.

Midnapur. 328

Midnapur district contains a few professional gold-washers, who apparently carry on their industry in the beds of the Kasai river and its tributaries.

Bankura. 329

Bankura district.—Gold is reported to have been obtained in very small quantities in the sands of the Dalkissur at Bankura.

Chutia Nagpur. 330

Chutia Nagpur.—Ball writes, "From the characters of the rocks found in the sub-divisions of this province, it is not improbable that gold occurs in all of them, whether because it is less abundant in some, as is probable, or because it has never been properly searched for, the fact is certain that in others there is greater attraction for the indigenous gold-seeker. Judged by this standard, the richest tracts are situated in Manbhum, Singhbum, Gangpur, Jhashpur, and Udaipur. That these, or some of them, may yet be the scene of extensive operations, should the gold-mining in Southern India be successful, is very possible. The indications afforded by the alluvial deposits of sources of gold existing in the rocks over several large areas, are perhaps quite as striking in their way as those which led to the starting of the gold-mining industry in Southern India. Quartz or reef mining and crushing, however, can scarcely be said to have been tried in this area, but one solitary and not very expensive attempt having been made." It is stated that three companies have lately (1890) started for gold working in this province, and that a probability exists of two or three other companies being formed for the same purpose.

Manbhum. 331

In *Manbhum* the localities where gold-bearing sands exist are very numerous; indeed, in the southern half of the district, gold is to be found in nearly every stream. Ball discovered, by a systematic application of

Gold. (J. Murray) GOLD.

BENGAL Chutia Naggur.

Singbhum 332

state (*Medico Topography of Ceded Provinces, 1826*)
Many records

river Ebe or Ib there are tracts at some distance from the banks, which are honey combed with shafts sunk by successive generations of gold-

mint for assay, and a nugget from some other part of Jashpur was presented to the Geological Survey Museum by Colonel Dalton The latter

BENGAL.

are the Mand and Ebe, with their numerous tributaries. As there is always water in the Ebe, it is possible that some system of hydraulic mining might be applicable. Be that as it may, there cannot but be gold-bearing reefs from which all this gold has been derived."

Udaipur. 333

In *Udaipur State*, also, the rivers contain auriferous sands. The first to call attention to the washings in this state was Colonel Ousely in 1847, at which time he reported that three families at Rabkob obtained a livelihood by the industry. In 1849 a Mr. Robinson took a lease of the village, with permission to work the mines, from Government, and found as the result of his trials that a man to whom he paid 1 anna could earn for him 3 to 4 annas worth of gold. The gold obtained was valued at the Calcutta Mint as worth R14⅝ per tola. The unhealthiness of the district for Europeans appears, however, to have resulted in the cessation of the enterprise. In 1865 the number of native gold-washers was stated to have increased to six families, and the reporter (the late Colonel Dalton) wrote that the production of gold was only restricted by the number of washers.

CENTRAL PROVINCES. 334

V. Central Provinces.—Gold-bearing sands occur in most parts of these provinces, wherever there are exposures of the older crystalline rocks. Judging by the census returns of 1872 Nagpur division is the richest, followed by Jabalpur and Chatisgarh, while in the Narbada division none of the inhabitants were returned as gold-washers.

Chatisgarh 335

Chatisgarh Division.—In the district of Sambalpur gold-washing is pursued as an industry at Sambalpur town on the Mahanadi, and at the village of Tahud on the Ebe. In the Bilaspur district gold is known to occur in the Jonk river at Sonakhan. In the Raipur district 12 gold-washers were returned in the 1872 census, though it is not known in what localities they pursue their avocation. It has been asserted, however, that gold is procurable in the Mahanadi at Rajoo (probably Rajim is meant by this name).

Nagpur. 336

Nagpur Division.—In the Bhandárá district gold-bearing sands occur in streams near Ambagarh and Thirora. In these waters gold-washing operations are carried on, and in some places mercury is employed in separating the finer particles. In the Chándá district the search for gold is said to be carried on in the eastern parts of the area, but there are no definite details as to the actual streams in which the metal is found. Gold is washed in several places in the Bálághát district, the auriferous streams being chiefly situated in the Lanji and Dhansua Parganas. Of these the Son and Deo are richest in the metal. The census returns of 1872 give 103 gold-washers in the Nagpur district, but it is probable that these men carry on their operations chiefly in the adjoining districts.

Jabalpur. 337

Jabalpur Division.—In the district of Wardhá, Ságar, and Dámoh returns are made of some 52 gold-washers, though there is no record of the occurrence of gold in these localities. The sands of the Parqudhur stream, in the Seoni district, however, produce gold. Balfour states that the washers of the sands of this river consider it unlucky to make more than 4 annas a day, as they believe that the goddess who makes the gold would leave the locality if they exceeded that amount.

Upper Godavari. 438

In the *Upper Godávari District* gold is said to be found in two localities, namely, near Bhadrachellum and at Marigudem or Mariguram. The gold of the latter locality is of superior quality, being valued at R16 a tola, yet notwithstanding this fact, the work of washing is said in the *Central Provinces Gazetteer* to be "barely remunerative." It must consequently be inferred that the metal occurs in small quantity only. Gold-washing is also carried on in the Bastár State at Pratappur or Partabpur, and at Bharamgarh.

CENTRAL INDIA. 339

VI. Central India—*Ajmir-Merwara District.*—According to Dr.

CENTRAL INDIA

BOMBAY. 340

and in the province of Kathiawar.

Dharwar. 341

Dharwar District.—Gold has been found at Chik Múlgúnd, Súrtúr, Dambal, Dhoni, and in the Hurt river near Guduk. Mr Foote, in the *Records of the Geological Survey of India*, has given a *résumé* of the writings of other authors on the subject of gold in this district, together with his own observations He considers that the rocks of the known gold-bearing area belong to three groups or series, each characterised by cer-

locality, and apparently sank two shafts—one in the Dhoni, and one in the Kappatgode series

Belgaum 342

Belgaum District.—Gold-dust is said to have been found within the limits of this district at or near the villages of Belowuddi, Byl Hongul, and Murgur The quantity must, however, be small, since very few gold-washers pursue their calling in the district

Kaladgi 343

Kaladgi District—Mr. Foote mentions a report of auriferous sands

Kathiawar 344

PANJAB 345

axis of the Himalayas, or merely having their sources in the outer
formations do, as a general
ld must have a doubly deri-
l deposits of it, can be ex-
pected to occur.

The practice of gold-washing in this province is probably of considerable antiquity, formerly it afforded a source of revenue, indeed during the Sikh predominance, the tax amounted to one-fourth the gross produce. This

GOLD.	Gold.

PANJAB.

revenue has, however, here, as in most other parts of India, dwindled down to very small proportions, or become totally extinct. In 1860-61 it was R444 and in 1861-62 R530. Abul Fazl mentions that in the time of Akbar gold was obtained by washing in rivers in the *subáh* of Lahore. Ball states that the districts it is at present found are, Bannu, Peshawar, Hazara, Rawal Pindi, Jhilam, Amballa, and certain Native States, and gives the following detailed information regarding each.

Bannu. 346

Bannu District.—Gold-dust is obtained from the Indus at and below Kalabagh to the annual value of about R200. It is doubtful whether the source of the metal is the low tertiary rocks or the older rocks higher up the valley.

Peshawar. 347

Peshawar District.—About 150 men wash for gold in the Indus above Attock and in the Kabul river, during part of the year, their regular avocation being that of boatmen. Each man is said to obtain on an average about 2 to 2½ tolas of gold, which sells for about R15 a tola. Ball calculates, from the time spent in collecting, that this amount only yields a daily wage of about 2 annas.

Hazara. 348

Hazara District.—Here as elsewhere the Indus yields a small quantity of gold-dust, which is similar in quality and value to that obtained in the Peshawar district.

Rawal Pindi. 349

Rawal Pindi District.—The sands of the Indus between Attock and Kalabagh are washed for the metal. Dr. Jameson, in 1843, stated that about 300 individuals used then to engage annually in the search for gold in this region, employing large wooden troughs and mercury, that one-fourth of the proceeds was claimed by the Sikh Government, and that the actual earnings of the men were estimated to be from 3 to 4 annas a day. Within the last few years, it is believed, endeavours have been made to establish washings on the Ravi, and in other parts of the Rawal Pindi district on a large scale. The experiment was not, however, financially successful.

Jhilam. 350

Jhilam District contains most of the gold-washings of the Salt-Range. These are situated in the beds of rivers and streams arising from the lower Siwalik group, the detrital beds of which yield the metal. Ball states that "much of the gold is invisible or nearly so, and would be lost but for the employment of mercury." Under the Sikh Government about 160 cradles were worked, and afforded a revenue of over R500. Baden Powell quoting Dr. Flemming gives the annual production from these washings in 1848 as 1,013 tolas or about £1,600. The Bunhar river is specially mentioned by Mr. Wynne as gold-producing, and Ball states that from it westwards up to the Indus many of the streams which rise on the northern flank of the range contain gold.

Kangra. 351

Kangra District.—Gold is found in the Bias near Haripur, and also in Spiti, Kulu, and Lahul, but nowhere in large quantity.

Amballa. 352

Amballa District.—Specimens of gold from the Markunda river were exhibited at the Lahore Exhibition, and records exist of gold-washing having been carried in the neighbouring stream, the Gumti, from which the Raja of Nahan at one time derived a small revenue. Balfour mentions, but on what authority he does not state, that gold has been found in large quantities between Amballa and Kalka.

Gurgaon. 353

Gurgaon District.—Gold is said to be found in the streams near Sonah.

KASHMIR. 354

IX. KASHMÍR.—Abul Fazl states in the *Áín-i-Ákbari* that gold was found in the time of Akbar, in Padmatti, Puckely, and Gulkut (? Gilgit) of the Subah of Kashmír, and describes a peculiar process employed in obtaining it. This consisted in pegging down the skins of animals in the beds of gold-bearing streams. The hair on the skins acted, like the blanket used by miners in modern days, by arresting small particles of gold, which were

Gold (J Murray)	GOLD

shaken out after drying the skins Though there is apparently little doubt but that gold was at one time obtained n Kashmir proper few authentic records ex st regarding it At the present time, in the terr tories of the Maharajah of Kashm r the industry appears to be almost confined to

KASHMIR

Ladak
355

X TIBET —Though this country is not with n the limits of Ind a a short account of the gold obtained from it may be here g ven s nce there is every reason to believe that for many centuries it has been the source of a regular supply to th s country The survey part es of 1867 68 discovered the ex stence of large gold fields at Thok Jalung (in the province of Nari Khorsam) Thok N anmo and Thok Sarlung which were regularly worked by large encampments of Tibetan m ners One of the Pandits accom panying the expedit on gave an interesting account of the hab ts and methods of work of these miners one of the passages from wh ch may be here quoted as throwing a l ght on the old story of gold digg ng ants The cold is intense and the miners in w nter are thickly clad with furs They do not merely rema n under ground when at work but the r small

TIBET.
356

their tents which in summer amounts to 300 r ses to nearly 600 n winter They prefer the w nter as the frozen soil then stands well and is not l kely to trouble them much by fall ng n S r Henry Rawlinson and Professor Sch ern commenting on these observat ons arrive at the conclusion

sor Schiern argues that these may have been horns taken from the fur dress of the miners Ball thinks they may have been more probably the horns of *Ovis vignei* wh ch were probably in ancient t mes as they are

N W P
357

GOLD. | Gold..

COLLECTION.

Singhbhum District of Chutia Nagpur has been selected by Ball as typical, and may be here quoted :—"*Each tribe occupies a distinct tract, and poaching on one another's favourite streams is not indulged in to any great extent.* The wooden dish used *for washing, measures on an average about* 28 by 18 inches *for the men, smaller ones being used by* the women and children amongst the Jhoras. *The dish is hollowed* somewhat eccentrically to a maximum depth of $2\frac{1}{2}$ *inches. A scraper,* formed of a flattened iron hook set in a handle, *is used to collect the* auriferous sand and gravel which accumulates in the angles formed by the rocks in the bed of the stream. The dish when filled is placed in shallow water, and the operator working with his hands soon separates and throws aside all the coarser gravel and stones, whilst the agitation of the water serves to carry away all the mud and lighter portions. The dish is then balanced on the palm of the left hand and oscillated to and fro with the right; this serves to throw off the greater portion of the remaining gravel, and the process is completed by a circular motion, which is communicated to the water in the hollow of the dish, by which even the smallest particles of foreign matter is separated, and the final result is a residue of black iron sand, in which the specks of gold are readily apparent; but as mercury is not employed in this part of the country, all the very small and invisible gold is lost." As already stated, this process is supplemented in some parts of the country (*e.g.*, the *Panjáb*) by the employment of the amalgam *method with mercury*; in others skins, horns, &c., &c., are placed *in the stream to mechanically arrest fine particles of gold*, and in Assam *moss and slime scraped from the beds of the streams* are similarly used. An idea also prevails in Assam that gold can be obtained by burning the leaves of a plant known as the *copat*. A somewhat peculiar system exists in the washings of the Ningthi river on the Burma-Manipúr border. "The sand and gravel is first placed on a seive, the finer parts being allowed to fall through on to a hollowed plank 4 feet long and $2\frac{1}{2}$ feet wide at the upper end, and $1\frac{1}{2}$ feet at the lower which is open, the top and margins being protected by a rim $\frac{1}{2}$ inch high. The lower half is cut into grooves half an inch deep and the same in width. The fine sand caught in these grooves is washed in a wooden dish resembling a shield in shape which has a polished black internal surface and a receptacle in the centre Placed floating in water it is revolved till all the sediment is removed and the mere sand and gold are alone left remaining."

MEDICINE 370

Medicine.—Gold was in remote times employed as a *medicine in* Europe, and is to this day largely used by followers *of Sanskrit medicine*. Pliny informs us that in his time it was considered *a sovereign remedy* for 'green wounds,' that it was *supposed to destroy* warts, and that Roman mothers hung it round the necks of their children to ward off the evil effects of sorcery. By Sanskrit physicians it was supposed to be a valuable tonic and alterative, to increase strength and beauty, to improve the intellect and memory, to clear the voice, and to increase the sexual powers. These imaginary properties are still largely believed in, and gold is now, as it was centuries ago, much administered in Hindú medicine. Pure leaf gold is employed, purified by heating and cooling it alternately with *Kánjika*, oil, cow's urine, butter-milk, and a decoction of horse-gram. It is then reduced to powder by being rubbed with mercury and exposed to heat in a covered crucible with the addition of sulphur, and is in this form administered in doses of 1 to 2 grains. It enters into many complicated medicinal compounds, each of which is supposed to have some specific virtue. An exhaustive and interesting account of these will be found in *U. C. Dutt's Hindu Materia Medica*, from which the above abstract of the Indian methods of employment as a medicine has been mainly compiled.

DOMESTIC 3/1

Domestic and Sacred —Gold is largely employed by the richer class in India for purposes of personal adornment, and also in the decoration of buildings. It is unnecessary in an article such as the present to enter into a consideration of the several art industries, such as [illegible] filigree work, gold wire thread and lace, &c; for interesting and exhaustive descriptions of which the reader may be specially referred to the [illegible] the Journal of Indian Art.

TRADE 3/2

GOMPHIA, *Schreb. Gen. Pl. I, 318.*

3/3

Gomphia angustifolia, *Vahl; Fl. Br. Ind. I, 525;* OCHNACEÆ.

Syn.—GOMPHIA ZEYLANICA, *DC.*; G. MALABARICA, *DC.*; OCHNA [illegible] LATA, *Lam.*; WALKERA SERRATA, *Willd.*; MEESA SERRATA, *Gaert.*

Vern.—*Tacermari*, MALAY; *Bolaara-pa*[illegible], SK.

References.—*Gamble, Man. Timb.* [illegible]; *Thwaites, En. Ceylon Pl.* [illegible]; *W. and A., Prod.* 152; *Grah., Cat. Bomb.* [illegible]; [illegible] *O'Shaughnessy, Beng. Dispens.* [illegible]; [illegible] *Balfour, Cyclop. I,* 1247.

Habitat.—A small glabrous tree met with of South Western India [illegible] the South Konkan to Travancore, Singapore, and Ceylon. Distributed [illegible] China.

MEDICINE. 3/4 3/5

Medicine.—O'Shaughnessy states that the ROOT and LEAVES [illegible] and are employed in the form of a decoction in Malabar [illegible] and an anthelmintic.

TIMBER. 3/6

Structure of the Wood.—Used for building purposes [illegible] (Tenasserim).

Gomuti; see Arenga saccharifera, *Lab.*; Vol. I, 318.

GONIOTHALAMUS, *Blume; Gen. Pl. I,* [illegible]

3/7

Goniothalamus cardiopetalus *H. f. & T.; Fl. Br. Ind. I,* [illegible]; [illegible] *Ic. Pl. Ind. Or.,* [illegible]

Syn.—[illegible]

Habitat.—[illegible]

TIMBER 3/8

Structure of the Wood.—Used for many purposes [illegible]

Gooseberry; see Ribes Grossularia, [illegible]

Gooseberry, Cape; see Physalis peruviana, [illegible]

GORDONIA, *L.*; *Gen. Pl. I,* [illegible]

3/9

Gordonia obtusa, *Wall.*; *Fl. Br. Ind. I,* [illegible]

Syn.—[illegible]

Vern.—[illegible]

References.—[illegible]

GORDONIA obtusa.

The Gordonia.

Habitat.—An evergreen tree of the mountains of Western India from the Konkan to the Pulney hills, at altitudes of from 2,500 to 7,500 feet.

TIMBER. 380

Structure of the Wood.—"White with a straw tint, even-grained and pleasant to work, not unlike beech; it is very generally used for planks, doors, rafters, and beams, but warps if not well seasoned" (*Beddome*).

O. S. G. P. I.—No. 215 R. & A. D.—11-9-90.—1,350.